

▶ TABLET PC Q&A

▶ SONY CLIÉ SJ30/U



▶ PDAs IN THE MILITARY

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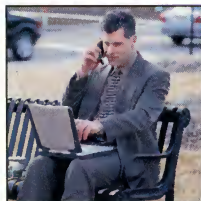
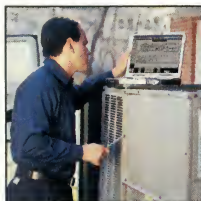


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“The T-Mobile Pocket PC Phone Edition combo is the best attempt at a completely integrated wireless voice and data communicator I have seen yet.”

— Conrad Blickenstorfer, page 73

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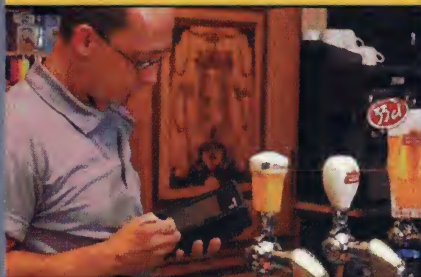


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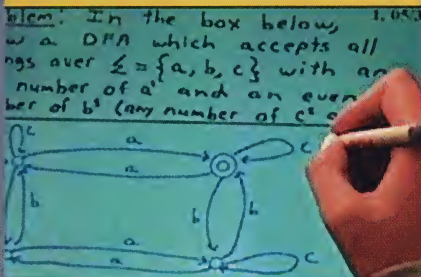
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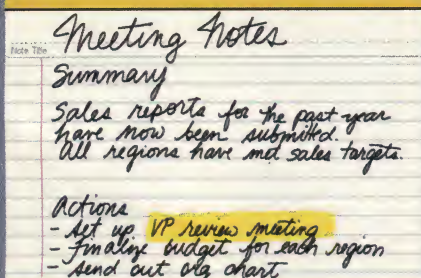
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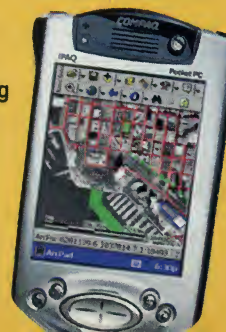
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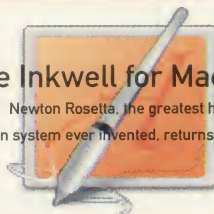


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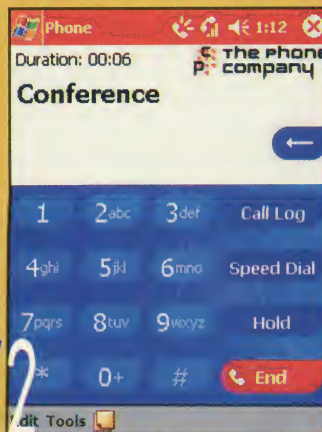
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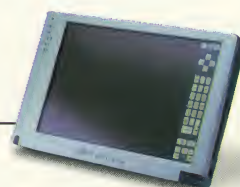
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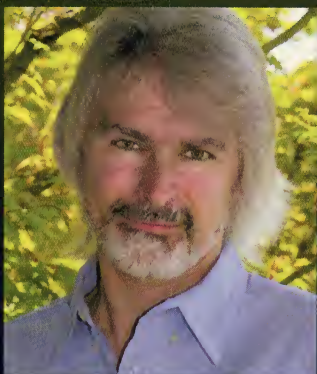


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**CONRAD BLICKENSTORFER**

*2002 hasn't been a good year  
for the technology sector.  
However, there are some  
interesting technological  
developments that may  
change mobile computing  
as we know it.*

**W**e're more than two thirds through this strange year of lingering after-effects from the 2001 terrorist attacks, a shaky economy, an alarming erosion of consumer confidence in technology, the financial markets and professions, and corporate America in general. As a print magazine, we experience the impact of all those woes as a precipitous drop in ad sales which are the lifeblood of any print publication. Life in the publishing industry is tough these days and several of our competitors have folded. On the other hand we're seeing some pretty spectacular developments and advances in mobile technology, and I want to address two of them.

First, there is renewed interest in what I call PDAPHONES—the merging of cell phones with PDAs. Second, there is Microsoft's tenacious, methodical advancement of the Tablet PC platform which we hope will provide the advantages of pen computing to a much larger audience and make it part of mainstream computing.

The merging of computing and telephony, of course, has been sort of a holy grail for decades. In the 1980s, AT&T tried to enter the PC market, with very little success. In the 1990s, there were several efforts to merge PDA and phone functionality into a single device, again with little success. One of the most notable projects (and failures) was the IBM/BellSouth Simon which looked like a large cellphone with an integrated display. The Simon could be used as a phone and also as a PDA. One of the reasons why the Simon failed was that people wanted to look up data or take notes while talking, something that wasn't possible with the display being part of the phone.

More recently, we saw Handspring's VisorPhone—basically an add-on module that connected to the Visor via its Springboard expansion slot. It was received favorably, but several rounds of price reductions (eventually down to free with service

initiation) made it clear that the market may not accept a device that carries a premium price *in addition* to the cost of the service. Why did Handspring do it? I think the company realized it simply could not turn a profit by engaging in a price war in low-cost Palm OS devices. Even high sales volumes would not lead to profitability if the profit margin is too small. Handspring probably also realized that it cannot go head-to-head with Microsoft in the multimedia and complex application arena that the Pocket PC occupies. That niche once was supposed to be handled via third party Springboard modules. There were indeed some very interesting modules, but the concept essentially failed because such modules rely on a stable, non-changing form factor to succeed. The larger modules designed for the original Visor didn't mesh well with the sleeker Visor Edge. In a sense, modules are limited to a form factor, which is a disincentive to module developers. In Handspring's case, with the low price/high volume market a losing proposition and the high end likely going to Microsoft, the company therefore decided to branch out to premium-priced PDAPHONES with the Treo 180, 270, and 300. The simple, straightforward Palm OS interface lends itself well for phone operation, and a small number of high profit items may be a better deal than a high number of small profit items.

The Microsoft Pocket PC Phone Edition, likewise, is an effort to merge PDA and phone. I have somewhat mixed feelings about that project as well, as apparently do almost all of the Pocket PC OEMs. If that weren't so, we'd have seen Pocket PC phones from the traditional Windows CE players such as Casio, Compaq, or NEC. Instead, the first representative came not from a hardware company but a communications carrier, T-Mobile. I've used the T-Mobile Pocket PC Phone Edition for several weeks and generally like it. It is a very

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attractive device that does a lot of things well. You need a phone? It is a phone. You want a Pocket PC? It is a full-function Pocket PC. But despite good integration between the phone and the PDA sides, the T-Mobile also raises many questions. For a detailed review, see page 70 of this issue.

While, in my opinion, the Pocket PC Phone Edition does a lot of things better than the Palm-based Treos, I remain unconvinced about the basic rationale for a PDAPHone and see it more as an attempt to merge multiple, distinctly different functionalities into one item—an approach that has spectacularly failed in various markets more than once. Apart from the fact that phones and PDAs have different hardware and power requirements, there is another fundamental difference: you can take a PDA out of the box and use it without any further costs or requirements. A PDAPHone, on the other hand, requires service activation, and there will be monthly bills, reports, late charges, credit card hassles, mix-ups and so on and so on. People who already have a cellphone will be reluctant to buy a PDAPHone because that means credit checks, fine print, and a second monthly cellphone bill unless they give up their conventional cellphone. You could, of course, argue that millions of people buy and activate cellphones, so the hassle factor does not necessarily deter them. It is therefore possible that once PDAPHones have matured people will buy them by the millions.

Me, I would consider buying and using one, but would prefer if the PDAPHone industry offered a different kind of service, one where I would only be charged if I actually use the phone. That service would require an account and a credit card, but there would be no recurring monthly bill. If I never used the phone part of the PDAPHone, there would never be a charge. If I use it, I get billed accordingly.

Another problem is the speed of the data service. While GPRS (General Packet Radio Services) data transfer service used in the T-Mobile theoretically can move data at the same speed as a 56kbps modem, in reality it operates much slower. At times, it hardly seems to move at all. That may not be a big deal when you use a simple smartphone, but it is a very big deal if you use a Pocket PC whose email client and browser are almost the same as those of a PC. Downloading even the headers of the 300 or so emails I get per day becomes impractical, as does browsing most webpages.

I don't know what the eventual answer is. PDAPHones may merge/morph into something as successful as Japan's i-mode DoCoMo phones, or they simply may be

an idea that doesn't work. In DoCoMo's case, interestingly, FOMA, the faster data transfer that I so badly want in my Pocket PC Phone, has been met with consumer disinterest and resistance. Apparently i-mode works well enough at the current data transfer rate and everyone is happy.

As for the Tablet PC initiative, we've been reporting on this massive Microsoft project pretty much from Day One, almost two years ago. Although not officially released, the Tablet PC will not only bring new form factors into the mainstream, but it will also popularize alternate input technologies such as inking, voice recognition, and handwriting recognition, something we here at *Pen Computing Magazine* have been writing about for almost ten years. Microsoft has been both very public about the Tablet PC, with numerous showings and presentations at major trade shows (and a highly visible champion in none other than Bill Gates himself), but also playing it close to the vest, so the actual impact of the Tablet PC platform is anyone's guess.

Hardware has certainly improved dramatically since the days of earlier pen computing efforts. Processors are now more than fast enough to keep up, display technology is light years more advanced, batteries are more powerful, and adequate disk space and solid state storage is simply no longer an issue. On the other hand, pen-specific software (inking, handwriting and voice recognition) and hardware (digitizers, pens) have advanced at a much slower rate, and we have yet to see a "killer app," the kind of must-have software application that will drive hardware sales.

To help you out a bit with making sense of the Tablet PC landscape and its potential impact, we have compiled a comprehensive Q&A feature that should answer most of your questions about the Tablet PC (see page 36).

In this issue you'll also find sort of a personal case-study I did on one of my favorite product lines, Panasonic's Toughbooks. Toughbooks are ruggedized notebook computers that fill the niche between conventional notebooks and heavy-duty specialized vertical market computers. I've always been intrigued by how a giant industrial conglomerate like Matsushita succeeded in both identifying a very narrowly defined market niche and then building the exact right products to fill that niche. A weeklong trip to Japan gave me a chance to see how they did it. It was a fascinating experience. Japan and the United States, two nations so different in lifestyle and general outlook on life, have this synergistic relationship that seems to fuel imagination and innovation. ☞

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## Hybrid handwriting

I recently read your piece "First Look at Tablet PC" and found it quite interesting and informative. My question is related to the handwriting recognition section. Whose software is Microsoft using? Is it from an outside vendor or developed internally?

**Henri Fink**

The recognition used in the Tablet PC edition is a hybrid. Microsoft uses both its own recognizer as well as the Paragraph Calligrapher code. According to Microsoft, both reco engines take a crack at each word. When they agree, it's assumed that the word was recognized correctly. When they don't, there's an algorithm that generates a list of likely possibilities. —Conrad Blickenstorfer

## Nokia quietly responds

I just wanted to drop you a line to let you know that I really enjoyed David MacNeill's column "What were they thinking?" in the July issue. And yes, I always found the "Silent" beep to be an unfortunate part of the Nokia 8260. But I wanted to let you know that our engineers heard the message that you and others put forward. On all of our new phones, the phone no longer beeps when going into Silent mode.

**Keith Nowak, Nokia**

## Enough already!

I subscribed to *Pen Computing* for the PDA news, yet in recent issues I've received half the magazine has been devoted to Tablet PCs. Enough already! Does your magazine have an affiliation with Microsoft? You seem more like a cheerleader for their Tablet PC than a news-oriented periodical. If you don't plan to include more PDA coverage, I won't renew my subscription.

**Brian Ball**

*Pen Computing Magazine* has covered all aspects of handheld and mobile computing since 1994, including, of course, PDAs. However, we have never been, and never will be a publication devoted solely to PDAs, because we cover the whole spectrum of pen technology. We have two sections devoted to the two dominant PDA platforms, Palm OS and Pocket PC. We also include news on what's going on with vertical market tablets and touchscreen notebooks. It just so happens that the latest iteration of classic pen-based computing is Tablet PC and we will cover the launch in detail.

We currently have no advertising from Microsoft, nor do we have advertising from many of the companies we cover in detail. So no, we're not a shell for anyone. We cover what's happening in touch-and-pen-based computing for the broad range of our readers.

Apologies that our coverage of PDAs does not completely satisfy you, but it is not our sole charter. We will continue to cover all aspects of mobile computing and communications, a formula that has worked well for us for almost a decade while other magazines have come and gone. —Shawn Barnett

## I'm keeping my baby

I have been a handheld user for many years and have been following the on-going debates and product evaluations with interest. So when visiting New York recently, I decided to look for a replacement for my ageing Psion Series 5 handheld.

After more than a week of intensive research, I was genuinely amazed to see what functionality the manufacturers managed to pack into today's miniscule devices. I was equally amazed to see how inherently user-unfriendly almost all of them still are. While most of them are equipped with some form of Graffiti character input, many people seem to shun it. So to make them useable, they had to grow add-ons of all kinds, the most obvious being various keyboards, which I often found unusable.

So eventually I decided not to replace my old monochrome Psion Series 5. The reason? Who in their right mind wants to write documents, do spreadsheets, compose faxes and emails or explore the web on a micro-sized portrait screen without decent input, even if the screen is high-definition color?

We know that the technology is there. My plea to the designers is to come up with a practical, usable handheld PC design, using their latest technological wizardry. Something like the following: A really flat, but useable device (say 6 x 3 x 0.5 inches) which, when opened, displays a decent-sized landscape color touchscreen and proper keyboard. With built-in software such as a Diary, Contact List, Word, Excel, Outlook Express, Explorer etc so that one can actually type a trip report, do an expenses spreadsheet and compose emails while traveling. A device which sacrifices some of the more gimmicky features for ease of use, good desktop connectivity and a long battery life. I am sure that there must be many more users like me who yearn for such a product.

The HP Jornada clamshells come close but are too bulky and expensive. Maybe I am missing something, but my old Psion Series 5 is the closest I ever came to a really easy-to-use and practical palmtop.

**E.E. Bester**

I think you hit the nail on the head. A lot of people feel the way you do. The mini-clamshell form factor is missed by many. And there really isn't a good replacement for the old Series 5. Personally, I have been using CalliGrapher/Transcriber handwriting recognition for many years, so it works for me — and I also like the thumb-boards as long as they are done well, as on the RIM BlackBerry 957.

I think what happened is this: Based on the great success of the old HP 95/100/200 micro clamshells and the flopping of the ear-

ly PDAs such as the Newton, Microsoft decided to go with the clamshell form factor when they introduced Windows CE in 1996. However, those devices turned out to be underpowered and not nearly as competent as the old HPs were in their day. I think it was a combination of uninspired hardware and underpowered software. When Microsoft finally started to get it right with "Jupiter," the larger versions of those handhelds and rev 3.0 of Windows CE, they got cold feet because those machines were a potential threat to low-end notebooks with their much more lucrative full Windows licenses. So they "crippled" those devices on purpose and let them die. That, incidentally, gave Psion a huge opportunity to take over the US micro-clamshell market. They halfheartedly tried with the Revo and the Series 7, but either didn't have the marketing budget or were just too boneheaded. As a result, many find themselves in your predicament. —CHB

## Take two tablets...

I just stumbled on your site and was very happy with all the information there. We have been commissioned to network a dental office and they want to be able to use handheld tablets. They currently have laptops with wireless cards which talk to a wireless access point for Internet access. We want to use the tablets because they are even more portable than the laptops. However, I am having a hard time finding what exactly to use, prices, etc. Do you know of any that are recommended for this?

**Jon Burgess**

I'd need to know more about how they use the tablets and what expectations they have in order to make recommendations. I don't know if you have our 2002 Buyer's Guide. If so you'd know that there is a bewildering number of actual and planned products.

To shed some light on things, the first big question is whether they need full-fledged Windows (i.e. 98SE, ME, 2000, or XP) or whether one of the Windows CE variants will do. There are now some CE tablets that have 10.4-inch TFT displays, speedy performance, and very capable browsers. Examples are the Sceptre X-Pad (also sold by ViewSonic as the SuperPDA), and the Siemens SIMPad. These products are light and offer excellent battery life.

If the office needs/wants full Windows, there are still a number of very capable tablets and pads, but they are generally a bit heavier and battery life is considerably shorter.

Finally, watch Microsoft's "Mira" wireless display initiative. Mira uses a wireless display to run full Windows XP on a very light tablet via an 802.11b wireless connection. They will be available later this year. —Conrad Blickenstorfer

## PDA: Pretty Damned Archaic

Will the PDA as we know it be replaced by cell-phone-style communicators? What will we do about text entry in the field?

**Jeri Lynn Zimmerman**

Yes, I believe so, and soon. You'd be surprised how few users enter more than a word or two on their PDAs; for the rest, Bluetooth input devices. Read my column on page 80. —David MacNeill



# COOL NEW PRODUCTS

EDITED BY DAVID MACNEILL ... DAVE@PENCOMPUTING.COM

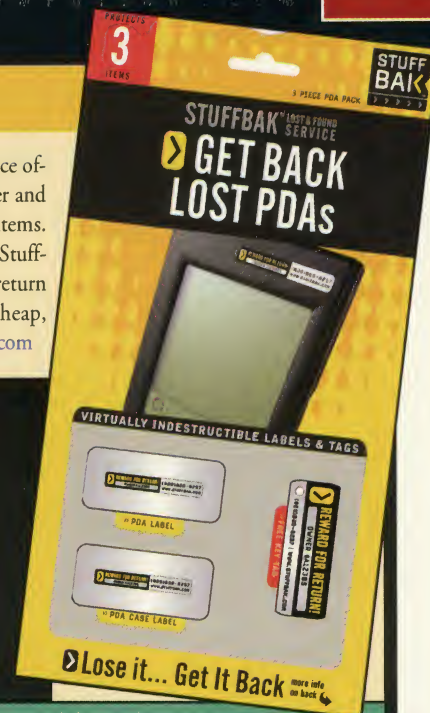


## DELUXE MOBILITY

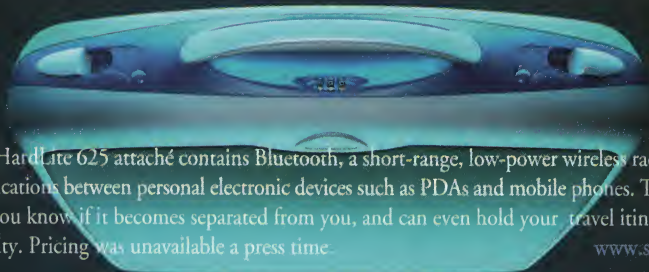
Here's an easy way to acquire the stuff you need to equip your notebook for the road. The Codi Deluxe Mobility Kit includes a USB optical mouse, cable lock, USB light, retractable phone and network cables, and a zippered bag for it all. US\$99. [www.codidirect.com](http://www.codidirect.com)

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Now this is a truly great idea. Stuffbak Lost & Found Service offers a variety of durable tags that provide a toll-free number and a web address to make it easy for people to return found items. For example, if someone finds your lost CLIÉ, they can call Stuffbak, who will then arrange for a courier to pick it up and return it to you. You pay only a US\$15 fee and shipping. It's cheap, anonymous, hassle-free insurance. US\$10. [www.stuffbak.com](http://www.stuffbak.com)



## SAMSONITE HARDLITE 625 BLUETOOTH ATTACHÉ



The Samsonite HardLite 625 attaché contains Bluetooth, a short-range, low-power wireless radio technology to enable communications between personal electronic devices such as PDAs and mobile phones. This smartly styled attaché will let you know if it becomes separated from you, and can even hold your travel itinerary and personal data for security. Pricing was unavailable a press time. [www.samsonite.com](http://www.samsonite.com)

## CYBER ACOUSTICS 5.1 SPEAKERS



Tired of the same old speakers hooked up to your computer? Toss those relics into the garage and pick up a Cyber Acoustics CA5001, an 80-watt surround-sound system. Color-coded wiring makes installation simple, and the right-side speaker has a master volume control and a fader to balance the rear speakers. The dual-ported bass reflex subwoofer has its own level control, which is good since the thing will rattle your floorboards at anything above half volume. There are separate inputs and cables for soundcards that offer discrete 5.1 surround outputs, but the CA5001 will take any standard two-channel input and simulate surround quite nicely. The trebles are crisp but not harsh, the lows full but not overly boomy, and fit and finish is excellent. It even ships with wall brackets for the rear speakers and a gamebox adapter. I plugged my iPod into this rig, fired up Elvis Costello's 45 and pumped it up until my fellow editors started yelling at me to turn it down — at least I *think* that's what they were saying. A great value at US\$79. If you don't have room for the surround feature, they make an equally great-sounding stereo version, the CA3550, for US\$49. [www.cyber-acoustics.com](http://www.cyber-acoustics.com)



## SANDISK CRUZER

SanDisk has released Cruiser, the world's first upgradeable, pocket-sized flash memory storage device. Cruiser accepts standard SD card media and doubles as a portable card reader that is compatible with most Windows and Macintosh computers without installing a driver. The switch exposes the USB plug or the SD card depending on which way you slide it; in the center position, both are protected inside. It's ideal for transporting documents from machine to machine, or for keeping confidential files with you. [www.sandisk.com](http://www.sandisk.com)

## MAXTOR 160GB DRIVE

With files getting bigger every day, space is still the final frontier. Maxtor's 160GB 3000XT drive with FireWire will let you boldly store more than ever before. US\$399.95 [www.maxtor.com](http://www.maxtor.com)



## DELKIN EFILM READER

Multiformat reader/writers are really catching on, and for good reason: they make it easy to access any flash memory card in use today: CompactFlash Type I/II, SecureDigital/Multimedia Card, Memory Stick, and SmartMedia. US\$50. [www.delkin.com](http://www.delkin.com)





# PEN NEWS

## ROSETTA REBORN!

The fabled Newton 2.0 recognizer lives again in Mac OS X.2 as "Inkwell"



Though faithful Newton lovers had to endure a few more snickering remarks from the otherwise likeable Steve Jobs, the Apple Print Recognizer—AKA Rosetta—that was so well received in Newton 2.0 has returned as part of the latest version of Mac OS X. Redubbed InkWell, it is the identical code with a new set of control gestures appropriate to a desktop computing environment. Currently supported only by Wacom graphics tablets, Inkwell offers system-wide printed text recognition in any application.

Where Apple will go with Inkwell is anyone's guess, but many have surmised that Apple will ultimately incorporate it into a tablet Mac and in the widely-rumored iPhone communicator. We're overjoyed to have such great technology back in our hands. Read David MacNeill's review on page 20. [www.apple.com/macosx](http://www.apple.com/macosx)

## ELECTRIC POCKET

### Customizes Treo Ringtones

Ringo 3.0, the ringtone manager for the Handspring Treo from Electric Pocket, lets users compose and share custom ringtones, and now supports association of photographs and graphical icons to a caller. When a person calls, a photo of that person could pop up on the screen. "The Treo is a lifestyle device and is the perfect personalized handheld, meeting each user's own specific need," said Iain Barclay, co-founder of Electric Pocket. "The ability to put faces with the names of incoming callers is a fun and practical addition to Ringo."

[www.electricpocket.com](http://www.electricpocket.com)



## PDA Shipments DIVE

According to IDC, worldwide handheld shipments declined almost 10% to 2.62 million in the second quarter of 2002. After the HP/Compaq merger, HP is now the number-two handheld device vendor in the world. Palm's market share was 32.2%, still leading HP/Compaq, which commanded 16.5% share, by a wide margin. Sony, Toshiba, and Legend were the only handheld vendors who actually increased shipments. [www.idc.com](http://www.idc.com)

## WACOM support for Tablet PC hardware

Wacom Technology Corp. offers two new higher-resolution digitizer sensor boards, in addition to its current 10.4" design, that provide up to 2,500 lines per inch maximum resolution—2.5 times more than the previous 1,000 lines. The two new digitizers measure 12.1" and 8.4" diagonal. Also new is the company's Executive Pen for Tablet PCs. It is a metal pen with a high quality look and feel. It provides 256 levels of pressure and the side switch can be programmed. Wacom's 3.5 and 4.0" digitizers may be used in PDAs which now all use touch-sensitive digitizers. [www.wacom.com](http://www.wacom.com)

## Phatware ships for Pocket PC dbExplorer

Pocket dbExplorer 2.0 is an advanced database management utility for Pocket PCs that allows viewing and editing of any application and system databases. [www.phatware.com](http://www.phatware.com)

## GolfPS 1.0

Serious golfers will want to take a look at the GolfPS personal GPS-based Golf system for the iPAQ with course mapping that shows where you are and records the position of every shot! [www.golfps.com](http://www.golfps.com)



## Juniper Allegro CE

Juniper Systems, Inc. introduced another alternative for those who need a waterproof, rugged handheld for field use. The 1.8 pound Allegro CE sports an impressive IP67 rating, uses the ubiquitous 206MHz StrongARM, Windows CE 3.0, and a vast variety of configuration options. Battery life is up to 30 hours. [junipersys.com](http://junipersys.com)



## Intermec to employ AirFortress

Intermec Technologies Corp has announced a partnership with Fortress Technology which will result in greater security for its wireless networks. As part of the partnership, Intermec will make Fortress' AirFortress Wireless Security Solution available as part of its MobileLAN wireless local area network suite. AirFortress is the first 802.11 security solution to receive the US Government's Federal Information Processing Standards 140 certification (FIPS 140). AirFortress are designed to defend against a wide range of attacks used to interrupt or intercept wireless LAN traffic. [www.intermec.com](http://www.intermec.com) [www.fortresstech.com](http://www.fortresstech.com)



## Sharp Mobile Goes Consumer

The Consumer Edition of Sharp Mobile Services for the Zaurus SL-5500 PDA was introduced on August 22. Running on the Verizon Wireless CDPD network, it's an end-to-end wireless email solution that allows receipt and viewing of Word, Excel, and PowerPoint files, plus Web browsing. Users get an Enfora Pocket Spider 2 CDPD modem, which it is claimed delivers better radio performance as well as longer battery life than its predecessor. [www.sharpmobile.com](http://www.sharpmobile.com)

## ACD Bundled with Fujitsu LOOX

ACD Systems will bundle ACDSee Mobile for Windows CE with Fujitsu Siemens' spectacular XScale-based Pocket LOOX Pocket PC which is a success in Europe but only sold to selected corporate accounts in the United States. [www.acdsystems.com](http://www.acdsystems.com)

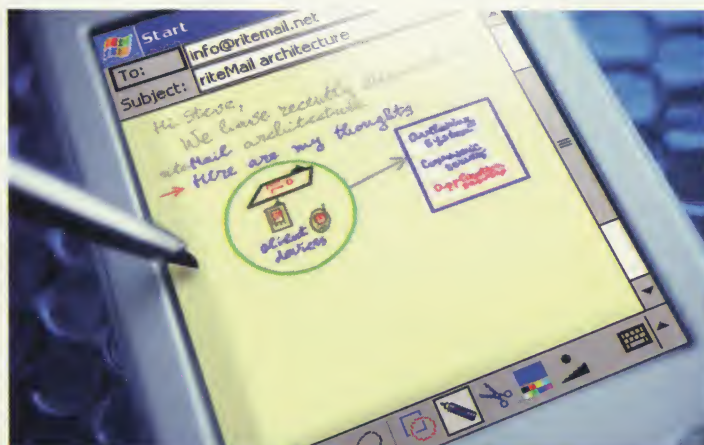
## Docs to Go Premium offers PowerPoint Creation on HANDHELDS

DataViz today announced its Premium Edition of Documents to Go 5.0. Among its major features is the ability to create and edit PowerPoint compatible presentations on Palm OS handhelds. The release includes a new word processor optimized for high resolution Palm OS screens, like the current high-end Sony line. The new word processor can also display paragraph formatting, tables, and graphics embedded into the document, and fonts can be changed in the handheld. The latest edition of Documents to Go makes for three levels of the productivity application, Premium being top of the line for US\$69.95, Professional is bundled with Palm brand handhelds, and Standard is available for US\$49.95. Current users can upgrade to either 5.0 or 5.0 Premium at prices detailed at the company site. [www.dataviz.com](http://www.dataviz.com)



## SONY ERICSSON intros T68i Camera with STEALTH

According to Reuters, Sony Ericsson has begun seeking young models to walk around public places toting their new T68i cell phone with a digital camera attachment called the CommuniCam. The models will ask passersby to take their picture with the unique combo. Pictures taken with the phone can then be emailed to other phones or computers. The CommuniCam can currently capture 352 x 288 pixel resolution images, and is available on the Web and in stores for around US\$170. [www.sonyericsson.com](http://www.sonyericsson.com)



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# Mobile Solutions

## TABLET COMPUTERS: JUST WHAT THE DOCTOR ORDERED

### Lincoln County uses ViewSonic ViewPad and Meditech software

Lincoln County, Maine, isn't the part of the world that first comes to mind when technology innovation is the topic of conversation. Home to famous throwback eateries like Red's Eats and Moody's Diner, a big part of Lincoln County's attraction is in the fact that time often seems to stand still in the seaside bergs and landmarks that attract visitors here in droves. Indeed, there's a charming aspect to places with names like Medomak, Muscongus, and Pemaquid; where the lazy putt-putt drone of a lobster boat heading out to haul its traps in an Atlantic fog is punctuated only by the tolling of a buoy bell and gull's cry.

While Lincoln County's postcard perfect images are timeless, innovation is vital to providing the kind of services upon which its residents depend. When those services are healthcare related, innovation is even more essential.

Lincoln County Shared Services (LCSS) is the operational arm of the healthcare network serving the region, and includes Miles Hospital, St. Andrews Hospital, and nursing and home healthcare facilities operating out of both. LCSS is responsible for managing the county healthcare network's finance, medical records, and data systems.

When Wayne Printy joined LCSS as its IS director in October of 2001, he inherited an organization in the midst of upgrading its network infrastructure and computing platforms. At the same time, LCSS needed to work to bring its medical record keeping in line with federal regulations enacted in 1996 and scheduled to take effect in 2003.

Known as the Health Insurance Portability and Accountability Act (HIPAA), the act requires all healthcare organizations, including insurance companies and healthcare providers, to adopt industry standard record-keeping systems while ensuring privacy and security of patient information.

Though he is not responsible for effecting LCSS' HIPAA compliance, Printy's efforts are complementary to the process. "The work I'm doing is not specific to HIPAA, but intended to make our patient care documentation, billing and productivity more efficient," Printy says.

After assessing his situation and the progress made prior to his arrival, Printy decided to augment existing Windows CE devices with wireless tablet computers that served as a primary platform for LCSS' upgrade. Working with InfoCater, a webpad and tablet computer reseller and consultant in Massachusetts, Printy opted for ViewSonic's ViewPad

1000 with 802.11b wireless (WiFi) support, running Windows 2000 and enterprise application software from MEDITECH, also based in Massachusetts.

Adapting to the changing needs of the medical community is nothing new for MEDITECH, which has been developing medical technology since 1969. As tablet computers make inroads into more and more healthcare organizations, the company's clinical application software has been gaining in popularity, says company spokesman Paul Berthiaume.

Martin Reynolds, research fellow with technology analyst firm Gartner, attests that the success of tablet computing in the medical industry is no fluke. "Where there is a lot of data collection and standard forms to be filled out, tablet computers are close to perfect," he says. "Notebook computers are likely to remain the platform of preference, but for vertical applications, tablet computing is phenomenal."

"A tablet computer is like a Palm Pilot on steroids," says InfoCater president, Geoff Palmer. "Tablet computing combines the convenience of popular handheld devices with the power and flexibility of today's laptops," he adds.

Printy's experience bears out that illustration. "We tried the ViewPad 1000 in the hospitals and nursing homes and they've worked out pretty well," Printy says, noting that the tablet systems and pen-computing interface have helped facilitate acceptance due to their simplicity and user interface, which tends not to intimidate

staff, especially, the ViewSonics work great."

The tablet systems are augmented by two Fujitsu wireless laptops, used by the nursing staff for situations calling for more extensive, descriptive patient information entries.

"If there's one thing I've learned it's that, in a complex environment, there isn't a single solution that will do everything," Printy says, pointing out that the tablets have proven to be appropriate tools for a wide variety of situations faced on a daily basis by LCSS. "And because of their acceptance, our rate of success has been greater."

Printy and his staff handled the tablet integration themselves — a job made easier on one hand due to the off-the-shelf nature of the systems and software. On the other hand, the wireless networking has required that Printy and his staff integrate WiFi access points throughout the Miles Hospital campus to ensure seamless coverage, while also implementing effective security to ensure data integrity and patient confidentiality.

Printy reports that the wireless network is "performing very well," largely because he and his crew have been careful to avoid the problems often associated with WiFi, which are not so much technical as related to improper planning and inattention to security concerns. "We spent the time to accurately place all access points for a campus-wide virtual LAN," he says. "You can be anywhere and still log in."

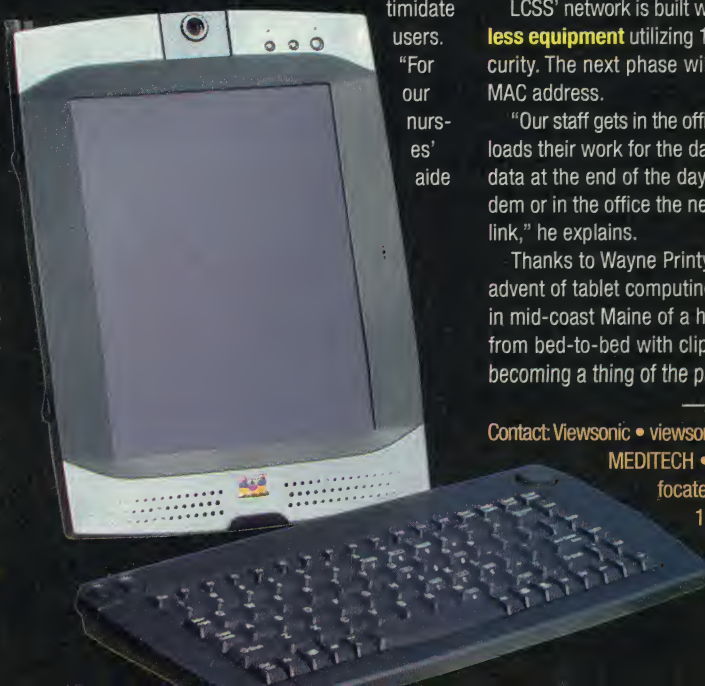
LCSS' network is built with Agere Orinoco wireless equipment utilizing 128 bit encryption for security. The next phase will see authentication via MAC address.

"Our staff gets in the office in the morning, downloads their work for the day, then they upload their data at the end of the day either remotely via modem or in the office the next morning with the WiFi link," he explains.

Thanks to Wayne Printy and his staff — and the advent of tablet computing — the traditional image in mid-coast Maine of a healthcare provider going from bed-to-bed with clipboard in hand is rapidly becoming a thing of the past. *■*


—By Mike Spinney

Contact: Viewsonic • [viewsonic.com](http://viewsonic.com), 1-800-888-8583;  
MEDITECH • [www.meditech.com](http://www.meditech.com); InfoCater • [www.infocater.com](http://www.infocater.com), 1-617-969-6853.



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# FIGHTING FIRES WITH HANDHELD TECHNOLOGY

PDA's, GPS systems, and mapping software combine to help firefighters succeed.

It's another sunny California day, but today the sun is slightly hazier. One of the biggest wildfires here in recent times—called the Pines Fire—is raging in the mountains northeast of San Diego. And the fire, which has destroyed over 40,000 acres so far, is just one of hundreds that mark what many know as the U.S.' worst wild-fire season ever (over 4.3 million acres burned since January 1, 2002.)

Even with today's technology, we still can't get enough water to the blazes fast enough to extinguish them. However there is one tech tool that firefighters now have in their arsenal—the PDA. While handhelds can't snuff out fires, they are helping firefighters find and predict them. Wireless Web based handheld communications tools enable hundreds of emergency workers to fight fires as a team, rather than as disjointed groups using sometimes-conflicting radio technology.

To effectively map wildfires, tactical geographic information systems (GIS) teams use GIS software on handhelds such as Pocket PCs that are connected to the space-based global positioning satellite (GPS) system. While flying over a fire, a spotter uses the either a keyboard or handwriting recognition software to map out lines and points showing hot spots, burning and threatened structures, ground units, escape routes, and water sources. On the handheld's color screen the data appears as color-coded symbols, along with fire line and the helicopter's current position.

Once the perimeter of the fire is mapped into a polygon, the crew delivers the data to the situation analysis mapping center (SAMC) either wirelessly in real time—or in person if wireless connections are not always possible.

At the SAMC, the data is loaded into a computer and within a few minutes, is printed out on detailed maps. Then, based on the map and information about the fire's speed and direction, commanders can make decisions about how to best

evacuate, and which structures to save.

Until the appearance of handheld-friendly GIS software, airborne fire spotters had to juggle laptops, separate GPS receivers, cell phones and cables for wireless connectivity, adapters, and spare batteries. Now they can do the job in the palm of their hand—using a lightweight handheld with built-in wireless modems and snap-on GPS receivers.

This handheld GIS solution is still new, and unique, among firefighting. The first time such a solution was used was in January 2001 when firefighters were able to map the Viejas wildfire in California's Cleveland National Forest, northeast of San Diego. In that fire, which was started by a careless smoker, mapping teams used **HP/Compaq iPAQ** and **ESRI's ArcPad GIS software** loaded with base maps of the Cleveland National Forest. Due to its large size, the map data was stored on a 2-GB PC card hard drive that slid into the iPAQ's PC card slot expansion pack. A **Garmin GPS device**—attached to the iPAQ via its serial port—completed the system, which weighed in at under a pound.

The Viejas fire crew was unable to send mapping data wirelessly because transmission between the helicopter and the tactical center required an ArcIMS server site, as well as reliable wireless Internet access. However once the teams returned to the SAMC, the data proved powerful in helping fire commanders bring the fire under control in just six days. The Viejas fire damage, though great, was limited to over 10,000 acres.

"We were able to display geographic coordinates in real time and direct helicopters to hot spots on terrains where it was too steep to send firefighters into," says Tom Patterson, Viejas fire team member and Fire Management Officer for Joshua Tree National Park.

More recently, the handheld technology has

enabled firefighters to battle wildfires near the Mexican border and in the San Bernardino Mountains in Southern California.

The handheld solution keeps getting better. With Pocket PCs now offering up to 64 MB of RAM and with optional PC, CF and SD card expansion storage, map data can be stored internally on the device. And the latest version of ArcPad not only

enables tactical GIS teams to transmit their position wirelessly, but also allows them to receive locations and other data from sources such as on-ground division supervisors.

Handhelds loaded with GPS software can also help firefighters on the ground to quickly find the fires they are heading to—a big plus when they're rushing around in \$750,000 fire trucks. Firefighters in California's San Mateo county, for example, can simply scribble and click on their Palms or iPAQs, or thumb-type on their RIM pagers to tap into FireDispatch.com, the county's fire dispatch database once accessible

only to department dispatchers.

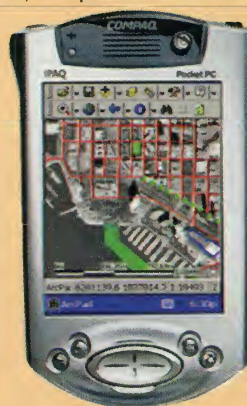
The city of Los Angeles is using handhelds to help prevent fires. The city invested in **Symbol's SPT 1500** handhelds with built-in bar code scanners, so that its brush fire inspectors can better track brush clearance by property owners.

Another new tool for firefighters is a nationwide Internet-based computer system under development by the National Interagency Fire Center that will help commanders with Internet-enabled devices to better manage firefighters and all their support gear, including air tankers, helicopters, crews, caterers, and even portable showers and toilets.

When coupled with GPS software and more reliable wireless connections, such real-time data technology should bring new strategic advantages to fire commanders and their brave crews.

—Gary Thayer, (gthayer5@cox.net)

Contacts: HP • HP.com; ESRI • www.esri.com; Garmin • www.garmin.com





# HANDHELDS GO TO HOLLYWOOD

## Retailer Reaps Rewards from Pocket PC Audits at 1,800 Stores

Each year, lost or stolen inventory costs retailers billions of dollars. This is especially true for retailers of high-volume, but small-size goods, like video stores. Hollywood Video, one of the largest video chains in the U.S., is using handheld technology to help tackle the problem.

At each of its 1800 Hollywood Video stores, parent company Hollywood Entertainment Corp. carries out quarterly audits to help the company keep losses as close to zero as possible. Previously, the company's loss prevention managers used a 12-page paper form with over 110 questions that addressed each store's compliance with standard store operations, policies and procedures.

Once completing an audit, managers had to fax the pages to corporate headquarters, where the information was manually entered into a database for analysis and reporting. Although faxing the 12-page forms only took about 10 minutes, managers produced 300-400 audits every quarter, which added up to tens of thousands of pages of paperwork each year to be handled and entered by the Loss Prevention department.

Looking to slash the time and money it spent

on this process, Hollywood Entertainment converted its paper forms to electronic forms on handhelds. Now the company's approximately 20 loss prevention managers conduct quarterly audits on HP/Compaq Pocket PCs. Managers tap their way through questions on an electronic form, entering data with the device's pen or keyboard. Drop-down lists and other design elements allow the audit to be adapted for the size of the Pocket PC screen.

The program automatically calculates scores for each section of the audit, and assigns an overall grade to the store. Once complete, managers download the audit data directly into a Microsoft Access database at headquarters, eliminating paper-based operations and making audit data available for reporting the same day it is collected.

Jason Rackley, one of the company's Loss Prevention Specialists, created the Pocket PC audit application on his desktop PC with a Windows CE database development tool from SYWARE. Rackley created the forms and underlying databases, and then uploaded the application to the Pocket PCs. Any changes to the application can be easily done using the SYWARE tools, and

then synchronized to the handhelds.

"The new Pocket PC approach eliminates all the headaches," says Rackley. "Auditors simply open the Access database and run whatever reports are needed."

In addition to cutting redundant data entry, the handheld application has also eliminated the need to track down lost fax pages, decipher unclear text, and manage paper and faxing supplies, he reports.

Another key benefit is improved accuracy. The handheld application performs calculations automatically as questions are answered, eliminating the need for mental arithmetic or to consult a calculator.

"The more hands that touch the data, the more chance of a mistake," notes Rackley. "Now the auditor enters the data and it goes straight into the report. There's no chance of a math error or a name being entered incorrectly during re-keying."

And for the increasingly competitive business such as video/DVD resale, increased accuracy and speed translates into competitive advantage.

—By Gary Thayer, MobileVillage  
(gary@mobilevillage.com)

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## WHARTON'S SPIKE-TO-GO TAKES HANDHELDS TO HEAD OF CLASS

Before her next class Jennifer, a student at University of Pennsylvania's prestigious Wharton School of Business, takes out her wireless PDA. Instead of just using her handheld to update her address book or "to do" list, Jennifer instantly accesses the school's online student information portal to review some class notes posted by her classmates, and a list of campus MBA events scheduled that evening. Instead of having to trek home or to the library to access the information on a PC, she can access this and other information anywhere on the school's campus where there is wireless Ethernet coverage.

Such a scenario is reality thanks to "SPIKE To Go," the handheld version of Wharton's award winning intranet (SPIKE) that offers student services, email, news, events, and announcements—plus stock market data, local weather, and news from around the world—all in a single, customizable interface. SPIKE users can also access online course materials such as class notes or digital videos, access select Wharton library materials, participate in electronic discussion groups, and visit virtual "meeting places" for teamwork and collaboration.

Besides just viewing and saving links to data, SPIKE also allows users to sync SPIKE data to different programs, including their handhelds and desktop or laptop applications like Microsoft Outlook, Outlook Express, Palm Desktop or Netscape Mail.

The Wharton School, the U.S.' oldest collegiate business school dating from 1881, first created SPIKE during the 1994/1995 school year as an online student information resource. Each year the Wharton Computing and Information Technology (WCIT) department solicits ideas and feedback from the school's MBA and undergraduate students to further develop and refine the intranet.

"In our case the school has invested in IT," says Kendall Whitehouse, Wharton's Director of Advanced Technology Development. "Because WCIT was providing information to students before SPIKE, we were not creating new tasks [with the handheld system], but rather solving old tasks in a more efficient and more convenient way."

By 2000, fully 90 percent of Wharton's nearly 5,000 full time students were toting handheld computers around campus. Although the school did not require PDAs, the devices became popular with the increasingly tech-aware students because they helped them organize their busy schedules, says Whitehouse. Since Pocket PC is relatively new, most student handhelds run the

Palm OS. However since SPIKE is web-based, it is accessible via any handheld with Internet access.

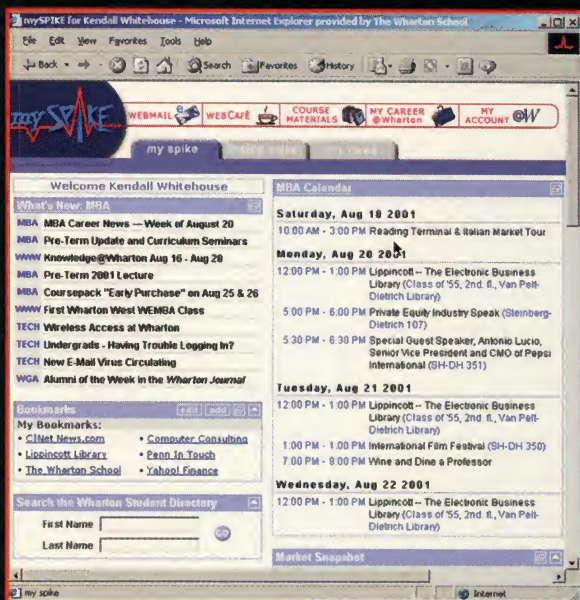
SPIKE's latest incarnation, called MySPIKE, is now introduced to new students along with a CD of additional utilities. One such utility is Adobe's free **Acrobat Reader**, which now allows students to view Acrobat PDF files on Palm and Pocket PC platforms. In addition, the school has licensed the full version of Adobe Acrobat for all of its lab computers, allowing students to save their papers and homework assignments in the PDF format.

Whitehouse sees the PDF format as happy medium between IT's two extremes: to let everyone do what they want and risk a lot of overhead costs, or to demand that users use a certain application. Since Wharton faculty and staff use a wide range of document authoring applications, Whitehouse saw the latter option as "too dictatorial." The PDF format can convert all of the major applications, while ensuring that the resulting documents can be opened and annotated by everyone.

"We have some faculty who even require student papers in PDF," says Whitehouse. "They like that format because they can annotate them, grade them and send them back."

Now that Adobe provides Acrobat Reader for both the **Palm OS** and **Pocket PC** handheld platforms, the school's nearly decade-long collection of PDF files can now be viewed on handheld devices. "It's amazing," says Whitehouse, "when you consider that these documents can be viewed on platforms that didn't even exist when the files were originally created."

SPIKE also offers several data options that allow users to receive data updates to their handheld whenever and however they choose. Options include **iCalendar**, **vCalendar**, and **Yahoo! SEED API** for date book updates, and vCard or CSV for address book updates, and handheld-optimized HTML for updated news, announcements, and calendar subscriptions. Data is transferred from Wharton databases and web sites using a custom-developed application known as the SPIKE Broadcast Server, and then delivered to the students' handhelds using middleware from **AvantGo** and **Pen-dragon Software**.



The data is transferred through desktop sync or at up to 11 megabits per second over Wharton's "Wi-Fi" (802.11b) wireless network—which supports laptops and all handhelds with a wireless Ethernet sled or card.

Whitehouse praises the benefits of the handheld solution. "The more transparent we can make it, the better it is for students," he says. "We can now communicate with students much more effectively by getting information to them in a timely fashion on a platform they've already chosen."

Although Wharton does not subsidize the cost of handhelds, the university provides students with a device comparison sheet, and this year it initiated a volume purchase agreement with Palm that allows discounted pricing on Palm m515 models. The university's computer outlet has long offered volume purchase pricing for desktop and laptop systems.

In the future, Whitehouse foresees even more applications and data available to students via their handhelds. He does not rule out the possibility of even textbooks being made available, if traditional and would-be digital publishers can resolve digital rights issues.

After his experience in helping build SPIKE, Whitehouse has some advice for IT administrators wishing to build a handheld program: avoid fragmenting your information download. "In other words," Whitehouse says, "they should not be saying 'oh look, we did this cool app on a handheld,' but rather 'our users can choose any platform or interface they want and be equally informed.'" That, he says, is "the secret of supporting handhelds."

—By Gary Thayer, MobileVillage (gary@mobilevillage.com)



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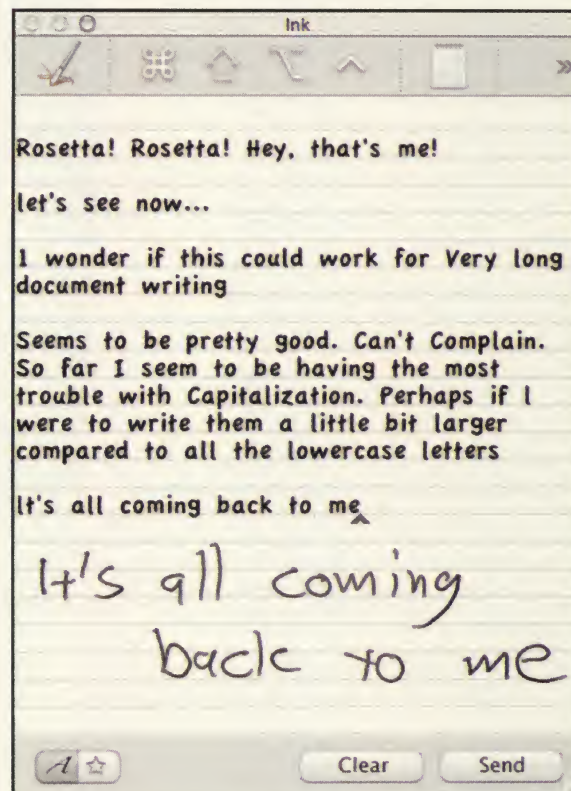
# INKWELL

## RECOGNITION FOR MAC OS X "JAGUAR"

Apple's much-admired Newton Print Recognizer resurfaces in the latest version of Mac OS X

by David MacNeill, executive editor

Every now and then, something happens that reaffirms your faith in humanity. Someone can bring something back into your life that you thought was gone forever, re-enriching your world in forgotten ways.



Such is the case with Inkwell, the printed handwriting recognizer built into Apple's latest operating system, Mac OS X 10.2, AKA "Jaguar". Inkwell is the Newton Print Recognizer originally developed by Apple for the Newton MessagePad 2000 and eMate 300, the technologically advanced, extremely influential, but economically disastrous pen-based computers Apple made until February 1998. Rosetta, as it was called internally at Apple, was



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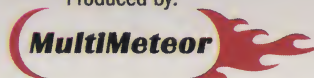
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This article is about how one company managed to create a successful product in a very difficult market. The company is Matsushita and the product is the Toughbook line of ruggedized notebook computers. Toughbooks are sold business-to-business into corporate and a number vertical markets. The installed user base is currently about half a million. The Panasonic Computer Solutions Company, Matsushita's US distributing arm for the Toughbook line, is growing much faster than the industry average. And they make money. They are profitable.

How can that be?

To give you an example of how difficult it is to succeed in the PC market, just look at IBM itself, the company that introduced the PC in 1981. Hundreds of millions of PCs have been sold since then, yet IBM soon lost the leadership in the market it created, and IBM never really managed to make much of a profit on PCs. And neither did most of its competitors. Clearly, creating a market and selling mass quantities of good products does not guarantee success. Not even if a company has the resources of an IBM, and if the products are of good quality and provide value.

Enter a relatively small team within the giant Matsushita company of Japan. In a veritable case study of excellence they conceived of a way to succeed in the PC market where others could not. They did that by analyzing the market, finding a niche, and then building just the right prod-

uct. They did everything right. The right niche, the right team, vision, perseverance, and probably a degree of luck. Everything clicked, and in one of those rare instances where everything falls into place, the Toughbook became one of the true success stories in mobile computing.

At *Pen Computing Magazine*, we have been following the Toughbook line almost since its inception and, over the years, have reviewed every model. So when we got an invitation to take a closer look at just exactly how Panasonic managed to do it, we jumped at the opportunity. My subsequent travels took me to Japan where I visited Panasonic facilities in Osaka, Kobe, and Tokyo. I also examined Panasonic's stateside service facilities in Kansas. Panasonic was extremely cooperative and gave me a chance to examine every aspect of the process, and talk to everyone involved. I had almost unprecedented



The Pentium 4-equipped Toughbook CF-72

access to every facility, and I found everyone being very forthcoming in answering every question, even the difficult and uncomfortable ones.

But first let me present a brief overview of the Toughbook line for readers who may not already be familiar with the Toughbooks. Toughbooks are "niche" products. The line includes notebook computers that range from slightly more sturdy than standard notebooks all the way to very rugged notebooks for use by the military and other markets where toughness and reliability are mandatory. They fill the market where computing power is needed, but where standard consumer products just can't make it. Utilities come to mind, insurance, healthcare, telecommunications, transportation, the government, field service and sales. That's how it started. Panasonic later found that corporations also were getting tired of the very high failure rate of notebook computers, and so they built high-reliability Toughbooks for that market as well. And recently, the line has been augmented with additional products such as wireless displays and a handheld computer. In terms of sales, the Toughbook line is relatively small, perhaps US\$300 million a year.

So how did the Toughbook come about, and how could it happen within a giant industrial complex like Matsushita, a no-nonsense manufacturing company famous for no-nonsense products? How could it happen in an almost US\$60 billion company that cranks out refrigerators and

# TOUGH

by C. H. Blickenstorfer

as

# Nails

Panasonic's Toughbooks —  
A high tech success story

Panasonic's computer factory near Kobe cranks out 300,000 computers a year





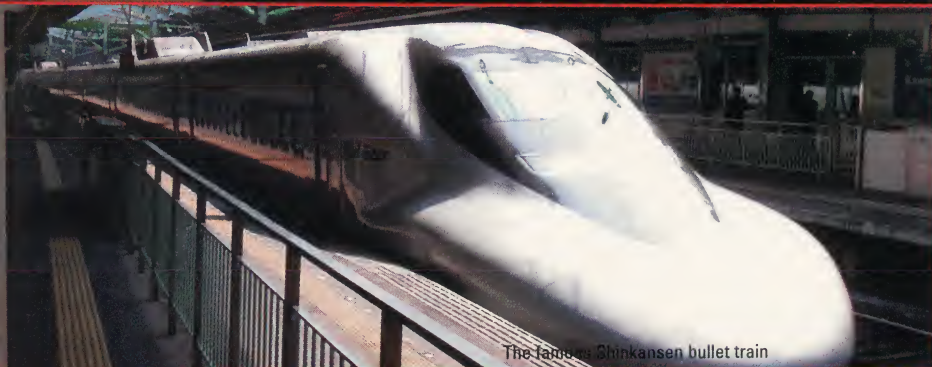
# FEATURE

## ***Mysterious Japan***

*Rising out of the mist, the islands of Japan welcome travelers with an intriguing mix of ancient tradition and avant-garde high technology. A trip to visit one of Japan's industrial giants, the Matsushita Electric Industrial Company, reveals how East meets West to create a unique line of computers – the Panasonic Toughbooks – that represent the very best of two worlds.*

Historic Osaka Castle began as a temple around 1496, eventually grew into a fortified structure and a self-governing temple-town. Today, it is the symbol of Osaka and dominates the landscape from miles around.

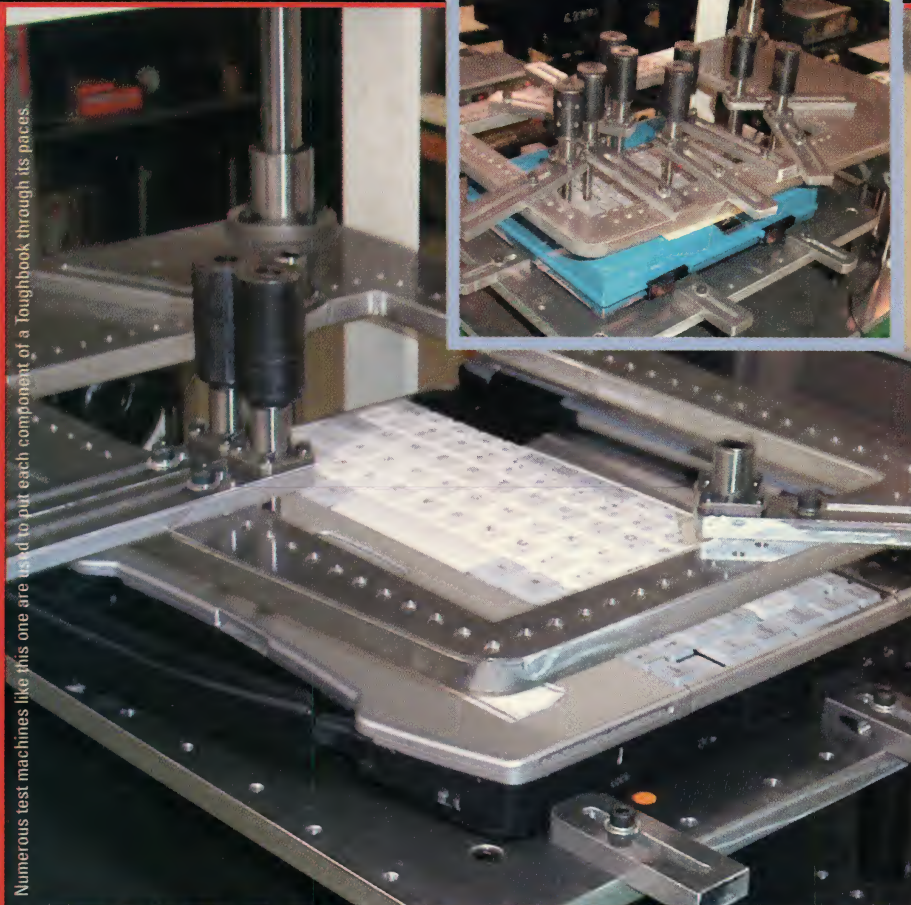
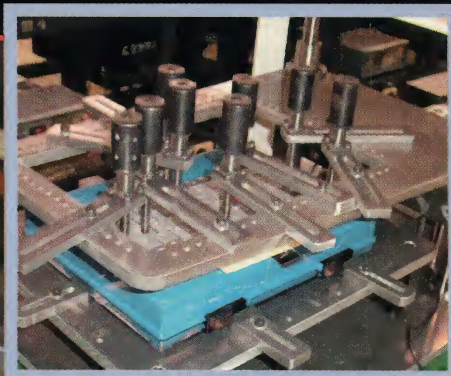
• A bit of water won't hurt a Toughbook 01



The famed Shinkansen bullet train



Numerous test machines like this one are used to put each component of a Toughbook through its paces.



Yoshi Yamada, father of the Toughbook, flanked by his top lieutenants, Mr. Hide Harada and Mr. Toshiyuki Takagi



microwave ovens with the same cold efficiency Toyota employs to crank out Camrys and Corollas? A company that perhaps lacks the playfulness and marketing savvy of arch rival Sony but makes up for it with a blue collar work ethic that's second to none?

The answer is that it was extremely unlikely to happen. It came about because a man and his team of enlightened individuals had a vision, and made that vision a reality by skillfully tapping into all the resources a giant industrial complex could provide. What that team did is the exact opposite of the way things are done today. They did *not* farm out the entire design and manufacturing to OEMs or contract manufacturers. They did *not* go on a shopping spree to gather together the cheapest components from the lowest cost suppliers. They did *not* delegate and farm out everything until they, like most US computer companies, were merely marketers. Instead, they

**“ WE DIDN'T SET OUT TO MAKE JUST ANOTHER COMPUTER. WE SET OUT TO MAKE SPECIAL COMPUTERS FOR SPECIAL JOBS AND MAKE THEM BETTER THAN ANYONE ELSE. I THINK WE SUCCEEDED.. ”**





turned a perceived weakness into a strength. All Toughbooks are conceived, designed, built, and tested right there at Matsushita's own facilities. When they needed special batteries, they simply stopped by Matsushita's battery division. When they needed optical drives, well, Matsushita makes the best. When they needed a special case, Matsushita is a leader in manufacturing processes and one of the world leaders in magnesium casting. And then they put it all together right there at the most impressive Panasonic Computer manufacturing plant outside Kobe, Japan. The result is the real thing. Just like a Toyota is the real thing and in a league of its own, a league that the Kias and Daewoos and Hyundais of the world aspire to but cannot reach. Like Toyota, Matsushita is the real thing. 290,000 worldwide employees, 14,000 products, 320 companies, and an annual budget of US\$4.4 billion for research and development alone.

Things weren't always that good. Panasonic tried it the conventional way first. They made portable PCs in the early 1980s but couldn't make a profit. Between 1983 and 1990 they were a channel OEM, making computers for other companies. In 1992, Panasonic decided to change the focus of their PC operation and go for corporate and ruggedized sales to government, corporate and a number of special vertical markets. At *Pen Computing Magazine*, we've seen many rugged products over the years. They ranged from computers that looked more like science projects, to honest but underfunded efforts, to the real thing. With Matsushita's resources, it's clear that the Toughbooks falls into the third category.

I began my tour of Matsushita's Panasonic facilities with a visit to the Matsushita Hall of Science and Technology, which is part of the company's Moriguchi City complex in Osaka, Japan. The hall is a combination of Matsushita history, its many current concepts and products, a number of technology demonstrations, and a peek at future products. All in all, there are about 300 technologies and products, all

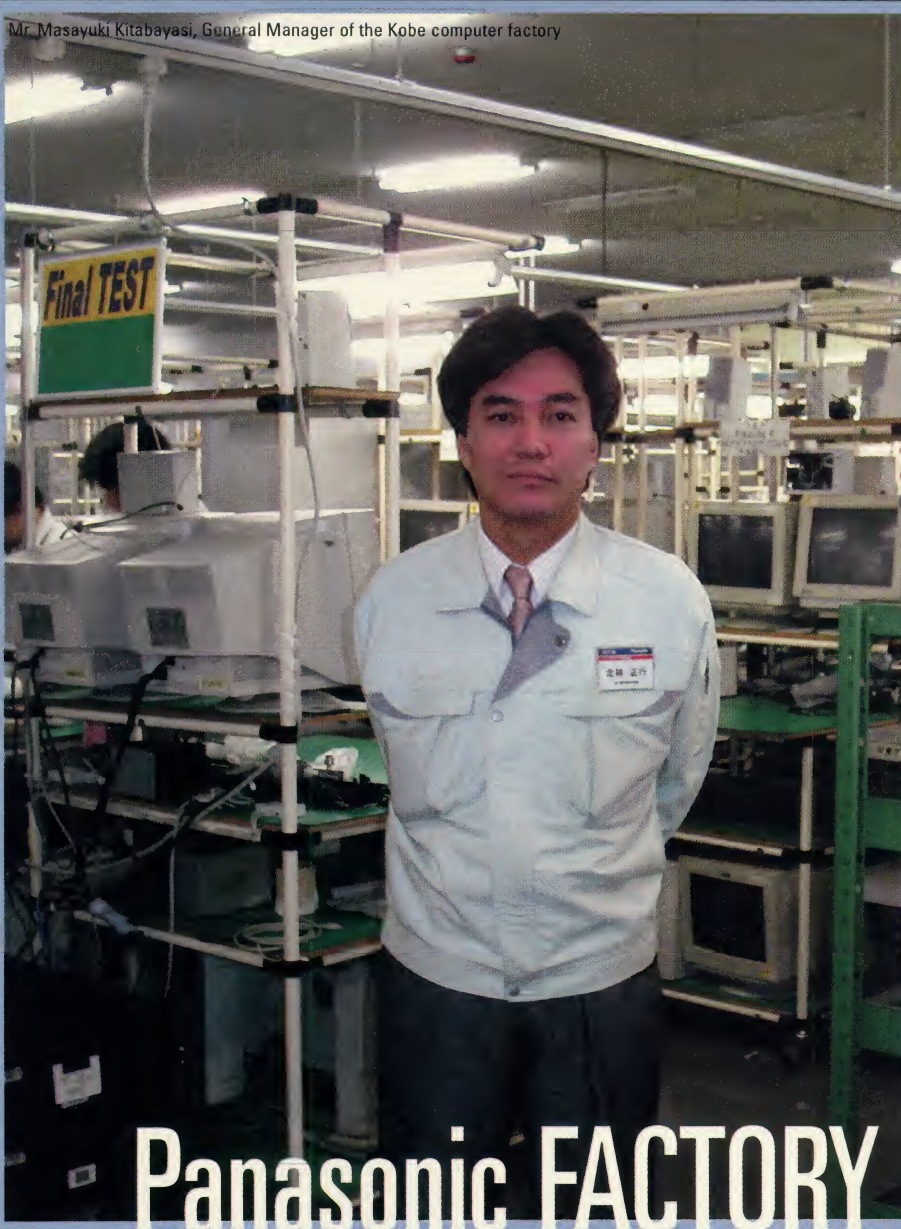
Workers at Panasonic's impeccably clean computer factory near Kobe



Engineers at work at the IT Products Division in Moriguchi City/Osaka



Mr. Masayuki Kitabayasi, General Manager of the Kobe computer factory



# Panasonic FACTORY in

# MAKING

chosen to highlight the company's dedication to research which, as a brochure points out, "is for the happiness of mankind." This sounds flowery to Western ears, but it is very much in sync with my impression from earlier visits to Japan. The Japanese view technological progress as something that increases happiness and well-being and generally and genuinely improves society. Sounds good to me.

My next stop was at the Moriguchi Office of Matsushita's Information Technology Products Division, the entity responsible for all Toughbook computer products. I met with the General Manager of Marketing and Sales, Mr. Hide Harada, and the General Manager of the Technology Center, Mr. Toshiuki Takagi. I learned that although Panasonic's considers its earlier forays into the PC market disappointing, the company actually sold almost two million notebook computers since 1987. Half a million of those have been rugged units, with 130,000 sold in the year 2000 alone. I also learned that the computer group has 250 engineers focusing solely on mobile and wireless technology and that the current capacity of the computer production facility is 2,000 units per day on ten lines. All core manufacturing and R&D is done in Japan. There are some foreign assembly facilities, and also a manufacturing facility in Taiwan that makes one of the Toughbook models. Facilities in the UK and the United States handle configuration and service.

Mr. Harada recapped the history of the computer division and related how in 1992 they decided to identify niche markets and eventually specialized

# Kobe



A Toughbook CF-28 takes an extended shower, one of many torture tests conducted at the Kobe facility



# TOUGH MACHINES

on corporate and ruggedized notebook sales to government, corporate and vertical markets. 1996 was a milestone year as they received a request from Lucent for Toughbooks with integrated wireless capabilities. Rather than simply using wireless PC Cards they decided to engineer wireless radios *into* the device. The result was an order for 7,000 Toughbook 25s using the Ardis and Motient wireless networks. Subsequently, plenty of research went into integrating wireless components into all Toughbook products. At the same time there was a constant effort to make products thinner and lighter without giving up battery life and ruggedness.

To reflect the solutions-oriented approach, Matsushita decided to change the name of the group from Panasonic Personal Computer Company to Panasonic Computer Solutions Company. While the initial focus of this solutions-based marketing approach was on Japan where the Toughbook line is sold under different names and includes some lighter duty models, it quickly expanded to the UK, the United States, and will soon be introduced in Germany and other countries. Panasonic's new approach was different, just like Fujitsu Personal Systems' approach was different, but it definitely put the Toughbook brand on the map. At a past PC Expo trade show a Toughbook 34 was being horribly abused yet survived, garnering much media coverage.

The essence of a "Toughbook" is that each is designed and built to withstand abuse that no ordinary notebook could survive. That involves plenty of research and also plenty of testing and certification. Panasonic performs "torture testing" in its own facilities, according to both Japanese and US test procedures, and the products also undergo independent tests. In the US, those tests are conducted by the Southwest Research Institute in San Antonio (swri.org), a non-profit testing agency whose clients include NASA and US auto manufacturers. SWRI performs MIL-STD 810 ruggedization testing.

It is important to understand that Panasonic's Toughbook computers are *not* consumer products but are geared towards mission-critical applications and uses. And while Toughbooks do not sell by the millions, orders can be quite large. Among the international success stories Panasonic likes to share are British Gas which bought 7,000 CF-27s in a customized solution that packed the computer, wireless communication and a printer into a special suitcase-like case. British Gas vans have those systems onboard and thus have instant access to parts lists, schematics, and manuals. In Spain and Canada, McDonalds uses the Toughbook 07 for taking orders. And Bell Canada is using the wireless CF-07s for field maintenance.

Throughout the presentations I was surprised at the complete openness with which Panasonic discussed the many ways they employ to detect and improve weaknesses in their products. For example, the US Coast Guard is interested in Toughbooks, but the inevitable salt water exposure required a battery of special tests. The tests resulted in substantial corrosion and salt build-up on the Toughbooks

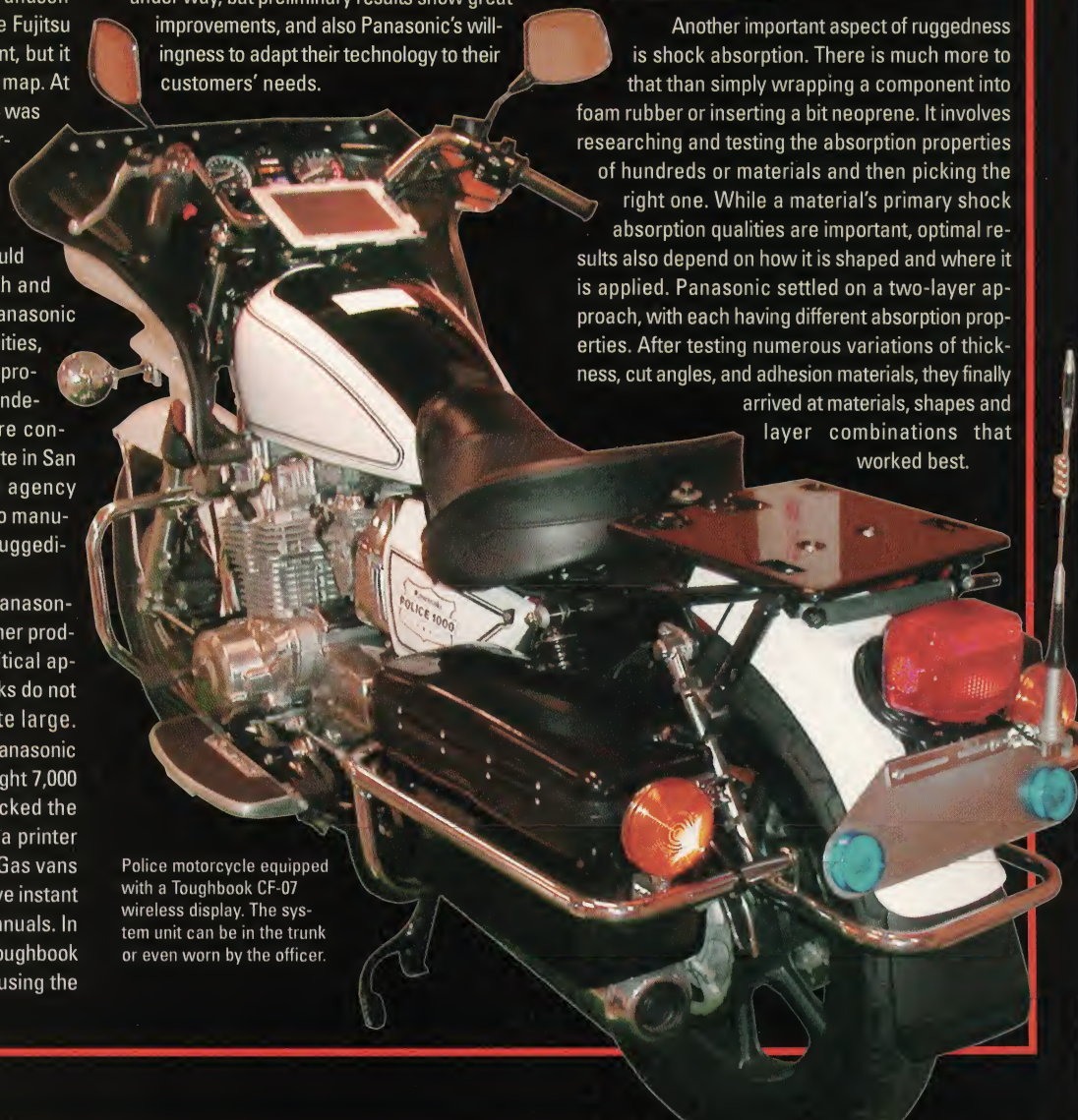


(see above). Panasonic engineers recorded the results and went back to the drawing boards to create a special model for the USCG that could stand up to use in saltwater environments. This includes special resistant paints, anti-corrosive greasing and coating, stainless steel screws, airtight gaskets, and sophisticated chemical counter measures against electric corrosion. The retest is still under way, but preliminary results show great improvements, and also Panasonic's willingness to adapt their technology to their customers' needs.



Worker at Panasonic's Kobe plant

Another important aspect of ruggedness is shock absorption. There is much more to that than simply wrapping a component into foam rubber or inserting a bit neoprene. It involves researching and testing the absorption properties of hundreds of materials and then picking the right one. While a material's primary shock absorption qualities are important, optimal results also depend on how it is shaped and where it is applied. Panasonic settled on a two-layer approach, with each having different absorption properties. After testing numerous variations of thickness, cut angles, and adhesion materials, they finally arrived at materials, shapes and layer combinations that worked best.



Police motorcycle equipped with a Toughbook CF-07 wireless display. The system unit can be in the trunk or even worn by the officer.



# KONOSUKE MATSUSHITA

## the man: Humble Beginnings

**P**anasonic, Technics, Quasar, and National are all Matsushita brands, yet most people do not associate those brand names with their giant parent company. And that would probably be just fine with the conglomerate's founder, a humble, yet driven man who always put engineering, manufacturing, and customer service first, and left the razzle-dazzle to others.

Like many giant companies, Japanese giant Matsushita Electric Industrial Company, Ltd. has small beginnings. It all started in 1918 when a young man named Konosuke Matsushita, who worked for the Osaka Lighting Company, came up with the idea for a dual electric plug, which was simply a second plug grafted onto a standard single light bulb fixture. His employer rejected the design, causing the young man to leave and start Matsushita Electric. The double plug was followed by a flashlight, a radio, a foot warmer, and other basic electric items. Each of the young Matsushita company's products seemed to fill a very specific need, and also trigger the development of additional items, or the branching out into new fields. For example, Matsushita's simple bat-



The simple double-plug that launched Matsushita

tery-powered shell lamps in 1920s created quite a demand for the "Excel" batteries the lamp needed, and Matsushita approached the Komori battery factory to work with him. Eventually he took over the battery company. So Matsushita's lamps actually drove the battery growth. Matsushita's history and legacy are documented in several company museums: the Matsushita Hall of Science and Technology, the Konosuke Matsushita Memorial Hall, the Matsushita Electric House of History, and others. The Hall of Science and Technology fea-

tures fascinating exhibits covering the different industries including computers, audio/visual equipment, networking, appliances, security, social welfare, health, and medical systems, home automation, electronic components. There is also a strong emphasis on "green" technologies and recycling, an important (and increasingly mandatory) part of Japanese industry. The visit showed that Matsushita has core expertise in almost every aspect of computer manufacturing.

It also conveyed the essence of this company: innovation and rock-solid engineering.



Tour guide at the Hall of Science and Technology



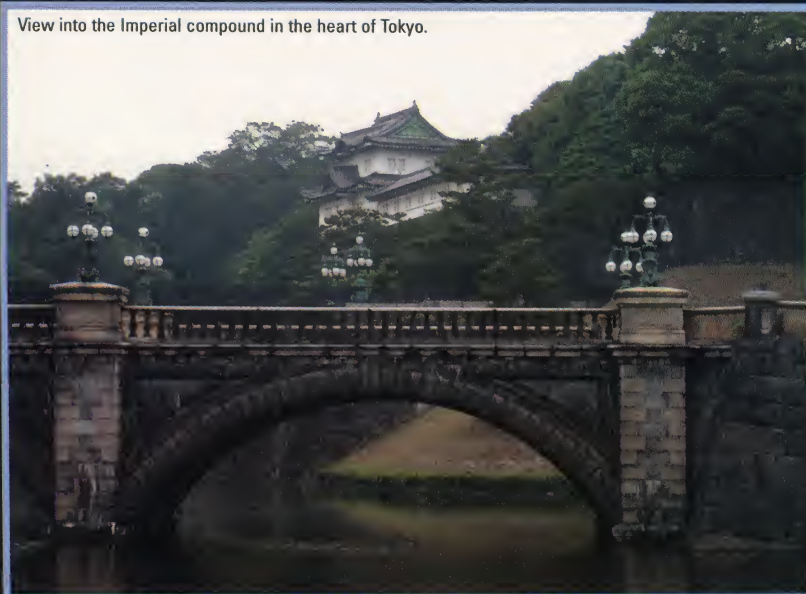
Matsushita founder Konosuke Matsushita at an official function





The ancient Sensoji Buddhist temple in Tokyo, dedicated to the Buddhist god Kannon

View into the Imperial compound in the heart of Tokyo.



Even the paint applied to the outer and inner surfaces of a Toughbook makes a difference. Hardness of paint is measured by the same standard as the graphite hardness of a pencil. Current paint hardness is 3H, but the engineers aim for 6H which means that the paint cannot be scratched by a 6H pencil. For plastics, the acidity in sweat can discolor or break down the paint or the plastic itself. PH levels are important and must be taken into consideration when specifying such materials. Since heat dissipation is always an issue with notebook computers, heat-insulating paints can minimize heat on metal bodies. Water-shedding paints can make water pearl off and a device so painted will be more resistant to dirt. But each change may impact other properties. I had no idea how much work went into perfecting every aspect of this.

With regard to wireless, Panasonic prides itself on using numerous standards in response to customer needs: Mobitex and DataTAC, CDPD, GSM/GPRS, and wireless LANs. Research is now on emerging technologies such as Bluetooth and faster wireless LAN protocols.

Since Toughbooks may be used indoors and outdoors, Panasonic currently uses both transmissive and transreflective technologies. Brightness and contrast are always big issues, and Panasonic engineers experiment with different fluorescent tube mounts, backlights, reflectors, and even multiple lamp 1000 NIT systems for stationary use in a never-ending quest for perfection.

During my visits, I had a chance to meet with Mr. Yoshi Yamada, the director of the computer division and the father of the Toughbook. Yamada is a remarkable man who succinctly and concisely explains the thought process he and his team went through. Like the computers he creates, Mr. Yamada is tough and all business. I immediately knew that this man would never build or authorize anything that he didn't believe in, anything that he did not feel was beneficial for his customers. In many ways, he reminded me of Jeff Hawkins, the brilliant yet humble creator of the Palm Pilot, and arguably the PDA.

My tour also allowed me a chance to visit the various divisions that contribute parts to the Toughbook. Matsushita's AV Technology Center, for example, creates some of the world's most advanced optical drives. It stands to reason that those drives will work extra well in Toughbooks because they came from the same people who make the Toughbooks. Which means that they're probably better integrated, better tested, and more suitable for the computer than a generic third party device.

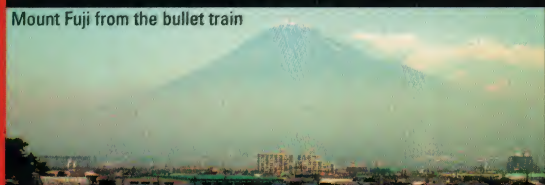
One of the most visible characteristics of Toughbooks is their magnesium case. With the exception of Walkabout's use of "milled aircraft grade aluminum" for their Hammerhead pen tablets, few computers are as identified with a particular material as Toughbooks are with magnesium. And Panasonic certainly made the most of this association. In the Toughbooks, magnesium is a design element *and* a structural feature. It's beautiful to look at *and* very tough. Highlighting it was one of the Toughbook team's great marketing ideas. However, working with magnesium isn't easy. It requires great expertise and a major investment in R&D and equipment.

Here again, having the full might of the giant Matsushita company at their disposal is invaluable as I saw when I met with Mr. Yukio Nishikawa at Matsushita's Production Core Engineering Laboratory. The mission of Mr.





Welcome at the battery factory



Mount Fuji from the bullet train



Yes, the French were not pleased...



The newest member of the Toughbook line, the ultralight CF-R1, at Tokyo's giant Yodobashi Camera store



Gods protecting the entrance to the Sensoji temple district

Nishikawa's lab is to develop new manufacturing processes that advance the state-of-the-art, create cost savings, and place emphasis on recycling and recovery which is becoming very important given Japan's tough new recycling laws. Due to magnesium's properties, the metal is widely used by Panasonic in products ranging from cellphones to computers to big screen TVs. Magnesium—light and readily available—is also rigid, conducts well, shields electromagnetic waves, and is easily recyclable. Add to that the much higher tensile strength and elasticity and it's clear why magnesium has become a desirable material. Most companies use a die-cast process that uses environmentally harmful SF6 gas to prevent the metal from burning. Panasonic uses thixo-molding, an injection process invented by Dow Chemical in the US, that uses melted magnesium chips and argon gas and offers increased safety and cleanliness, and higher quality parts. I was one of the few outsiders ever to get a tour through Panasonic's magnesium foundry with its thixo-molding machines. An impressive sight indeed.

Earlier, I mentioned that Matsushita even makes the batteries that go into the Toughbooks. A tour through Matsushita Battery Industrial company (16,000 employees and factories in 14 countries) conducted by Mr. Kuniharu Iizuka revealed an unbelievably complex and complicated facility that is sort of like the ultimate Rube Goldberg machine. Batteries are born in a process that takes them through a sequence of impossibly complex machines where the chance of something going wrong seems endless. The line I saw was for CGR18650 Lithium-Ion rechargeables where positive electrode, negative electrode, and separator material are first rolled tightly, then insulated, and inserted into a metal bullet casing. It then gets terminal contacts and is filled with electrolyte that settles through a number of steps. A cap is put on, the whole assembly is crimped, sealed, and then shrink-wrapped into a plastic shell. Numerous tests are conducted at every step. Whenever something goes wrong and a warning sound goes off, a specialist immediately diagnoses and fixes the problem. Environmental conditions are crucial and meticulously maintained. It is hard to even imagine the complexity of this assembly line. Then the battery goes into a Toughbook.

During my time at Matsushita I jotted down some 10,000 words of notes and impressions. It could easily have been 20 or 50,000. This feature represents just a summary, a brief look at a project gone right, one where smart people did everything right and came up with a product that meets and exceeds the needs of both the customer and the company that makes it.

I am sure other fine companies have stories to tell, but I must say that the Panasonic Toughbook story ranks right up there as a prime example of how things ought to be. ☺

<http://www.panasonic.com/toughbook>



Board level repair at Heartland



Patrick Cocherl, Heartland president



Heartland technicians, the can-do crew



New 38,000 sf Heartland facility near Kansas City



# SERVICE

“STRIVE TO  
SERVE THE  
WAY YOU  
WOULD LIKE TO  
BE SERVED.”


Heartland motto

Service, of course, is of utmost importance to mission critical equipment. All Panasonic Toughbooks are serviced by one independent facility located in Leawood, Kansas, near Kansas City, Missouri. I expected just another repair facility, a nondescript shed full of parts and guys with soldering irons. Instead, I found an impeccably neat and clean, superbly planned, and extremely well run and managed high tech servicing plant that just blew me away.

Heartland Services was started in 1987 as a component level board repair facility by Patrick Cocherl. Cocherl grew up in Gary, Indiana, and is the quintessential American entrepreneur. Cocherl has two servicing facilities, a 48,000 sqft plant near Chicago that services Panasonic copiers, fax machines, and printers, and the brand-new 38,000 sqft Leawood facility that exclusively services Toughbooks. The MBA-educated Cocherl literally exudes leadership and he is very proud of the impressive facility he built for Panasonic and his team. Walking through the plant, he talks about his company and his team and it's immediately clear that this is much more than just a shop. The boss cares. The boss is proud. The boss is tough, just like the equipment that is serviced here. He only employs the best degreed students and military people. And you need a 4.0 average. Those who pass muster are treated well. Turnover is virtually nil. Seven people in 16 years. Four out of the first five employees are still there. Families come to company parties. Heartland is family.

Cocherl rattles off the specs: The entire facility is completely static-free. All utilities are outside the building to keep the interior unaffected. There is forced air. You'll never find a single dust bunny anywhere. Heartland receives between 100 and 300 machines every day. A staff of 43 on the tech floor has access to a huge inventory of parts. If a unit is out of warranty, nothing ever costs more than the quoted estimate. Every unit goes through three quality control checks. Every unit is also cleaned and detailed. Turnaround time is 1.59 days average over the past five years. The return rate is less than one tenth of one percent. (And that one is usually damaged in transit or by the receiving operator.) All assets are tracked. And if a customer wants an extended warranty, a hot spare program, hardware integration, imaging, or whole unit refurb, they do that, too. Panasonic factory reps are there every month to discuss problems and listen to recommendations. "Our recommendations have saved Panasonic millions," smiles Cocherl.

Why would a huge company like Panasonic not have its own servicing facility in the US? Because Heartland proved to be perfect for the job. Board level repairs? Sure. No problem. And nothing ever needs to be shipped back to factory to be fixed. After a 15-year relationship with Panasonic, there is trust on both sides. "The Japanese are huge on loyalty," says Cocherl, "and they keep their promises." And so does he.

All of that makes Heartland more than just a service facility. It is one of the secret ingredients of the overall success of the Panasonic Toughbook. 





by Tammy Parker

## DATA SERVICES THAT MAKE YOU SMILE

WIRELESS PHONES BECOME EVER MORE PERSONAL

**W**ireless data is coming to town near you, and it might be time to try it out, if you haven't already.

By the time this column is published in *Pen Computing Magazine*, Sprint PCS will likely have launched its high-speed packet data network that is based on cdma2000 1xRTT technology. This technology is already being used by operators in South Korea and Japan and has attracted some seven million users. However, that's a somewhat tricky number in that 1xRTT is not only a data technology but also a voice technology that doubles the voice call capacity of an operator's network. So, many of those seven million users might just be making voice calls on their new 1xRTT phones and may not be data users at all. The anecdotal reports I've seen, however, indicate that a lot of those subscribers are data users, enjoying services such as SMS, digital image delivery and more.

While Sprint's launch is expected to be nationwide, rival **Verizon Wireless** has been launching 1xRTT networks city by city. Phil Redman, research director at Gartner, was kind enough to share some early summer research he conducted on Verizon's wireless data offerings. By July 2002, Verizon's 1xRTT network reached 60% of the total population it serves with digital mobile phone service. Called **Express Network**, Verizon's data service can be accessed with what are still a limited number of devices. The package cited by Gartner was the **Sierra Wireless 555 PC Card** (\$299.99), **Kyocera 2235 cellular phone** (\$79.99, data cable extra with Mobile Office Kit), **VX1 LG Smart-**

**Phone** (\$199 with two-year contract) and **Mobile Office Kit**, which includes cable and software for PC synchronization (\$99).

Gartner tested Verizon's Express Network service for about six weeks in Boston, Manhattan, Washington D.C., Dallas/Fort Worth and Philadelphia. According to the consultancy's report, service speeds varied considerably. Said the report, "Speeds ranged from as low as 9.6 Kbps to as high as 159 Kbps using Verizon's Venturi compression software, developed by Fourelle Systems. This speeds up connections for basic Internet access, but this proprietary compression cannot be used with a VPN (virtual private network) client that typically uses its own compression technology unless a separate Venturi middleware service is placed in the enterprise."

Gartner also found inconsistent service availability. I've long seen this as a potentially big drawback of relying on data service over a voice-oriented mobile phone network. Voice is carriers' bread and butter, and unless that changes, data users will always get secondary access to the network. Even if you get to make your data call during peak times, you can bank on the data speeds being lower than they would be at, say, 4am.

That point takes us back to the tremendous momentum behind wireless local area network (WLAN) hotspots that are cropping up worldwide. The thought is that mobile operators should be chasing this market in order to extend the reach of their data services as well as provide data access when their mobile networks are

congested with voice calls. From the point of view as a potential customer, I think this is great. However, looking at it as an analyst, I just don't see the business model for a mobile operator to simultaneously build out a next-generation mobile network and a fixed 802.11 WLAN network, unless that operator has some partners willing to assume risks for the unproved WLAN hotspot business. But since no one is listening to my opinion, there is considerable energy being expended to integrate mobile networks and WLANs, even down to the chipset level.

Anyway, Gartner put together a great table comparing the prices of US mobile phone-based digital data services that were available as of July. It doesn't take long to see that significant data use on these networks would be quite costly. However, Gartner thinks pricing will get more attractive, stating, "In the next year, we expect to see many variations on these pricing packages, including discounting based on aggregate voice and data usage, integration to public wireless LAN and home and enterprise access packages, and more flat-rate programs." The report adds that by 2004, wireless data services will likely cost a reasonable \$50 to \$70 per month. Given such forecasts, Gartner is recommending that corporate data users hold off on adopting such wireless data services until at least mid-2003, when the most technology-aggressive enterprises will want to jump in.

**Smile...**

...you're on mMode camera! While

### Packet Data Pricing by Operator

| Operator             | 1MB      | 5MB       | 10MB     | 100MB      | Overage/Kb    | Notes  |
|----------------------|----------|-----------|----------|------------|---------------|--|
| AT&T Wireless        | \$15.99* | \$29.95** | \$39.99  | \$199.99   | \$0.01        | *Up to 2MB ** Up to 6MB includes Short Messaging Service (SMS) |
| Cingular             | \$6.99   | \$153.60  | \$307.20 | \$3,072.00 | \$0.03        |  |
| Nextel PacketStream+ | \$15.99  | \$29.99   | \$39.99  | \$54.99*   | \$0.01        | *Unlimited usage plan  |
| Nextel PowerApps     | \$13.99  | \$25.99   | \$32.99  | \$54.99*   | \$0.01        | *Unlimited usage plan  |
| Verizon              | N/A      | N/A       | \$35.00  | \$99.99*   | Varies        | *Unlimited plan includes SMS messaging, roaming at \$10/MB     |
| VoiceStream          | \$2.99   | \$19.99   | \$39.99  | \$419.99   | per-MB charge |  |





corporate customers are the most likely candidates to fork over big bucks for wireless data services in the foreseeable future, AT&T Wireless recently introduced a digital photo service that will be very attractive to any amateur photographer. The question is whether consumers have the cash to pay for it.

The service is called mMode Pix, and works in AT&T Wireless' GSM/GPRS markets. Subscribers must use a \$130 camera attachment that connects to the \$200 Sony Ericsson T68i handset. The attachment turns the phone's color display screen into a camera viewfinder, and a button on the attachment can be pushed to snap photos. The attachment or the phone can then store the resulting JPEG images, which can be wirelessly sent out via the mMode email service. AT&T Wireless mMode customers can subscribe to premium services that allow them to post their pictures to online digital photo albums, from which they can download the photos to their phones as screensavers. Among other things, the photo images also can be used as wallpaper for a phone's screen or assigned as images that pop up when a certain caller ID is triggered by an incoming call. Just don't let your boss know you've got the photo of an angry orangutan assigned to pop up whenever he or she calls your mobile!

This is precisely the type of fun yet utilitarian service the mobile data industry needs ...if the price can be made reasonable for the mass consumer market as well as corporate customers. According to AT&T Wireless, mMode customers with the \$8 per month 1MB price plan can send 20-50 photos and still stay within their allotted data limits since photos are said to run between 20-60 kilobytes each.

## Erratum

In a recent column, I asked readers to tell

me about their attempts to install WLANs within their homes. I received several responses, all from people with encouraging experiences. A reader named Rick Centeno wrote that he recently purchased a Sitecom WaveLAN Access point and a WaveLAN PCMCIA network card. According to him, "At home I initially installed all the software included in the package and tried it out. Guess what, it worked right out of the box, without me having to change any of the standard settings."

He then connected the access point in his living room to a 10MB network bridge upstairs in his study. The bridge is connected to an ISDN router for Internet access as well as access to his office and three other desktop computers running, respectively, Win98, Linux and WinXP. "The router is running DHCP and is providing IP addresses to the XP, 98 machines and my laptop (running W2K). The IP of the Linux server is fixed," he adds. Centeno is now a confirmed believer in home WLANs. "Maybe it worked so great because I had already a good network set-up. I don't know, but I was very glad to see it working after hearing some horror stories from several other people."

Actually, I expected to hear all kinds of horror stories in response to my column. But all I got were positive reviews of home networking via WLAN. Hey, maybe this wireless stuff works after all.

Nextel offers two types of plans based on the needs of a customer's application. Subscribers purchasing a metered PacketStream plan are assigned a public IP address, which enables Internet-originated communication to the handset (push communications). Subscribers purchasing a PowerApp plan are assigned a private IP address. PowerApp plans are primarily intended for network-aware J2ME and wireless applications where handset-to-Internet (pull) communication only is required. Source: Gartner Research

*Based in Colorado, Tammy Parker has written about and consulted on the wireless communications industry for 16 years. She can be reached at [tlparker@ix.netcom.com](mailto:tlparker@ix.netcom.com).*

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# Pen in Classrooms at DePauw

DePauw University uses WACOM tablets, a SMART whiteboard, and custom software in a pen-equipped classroom

by David Berque, Ph.D.

Readers of *Pen Computing Magazine* are accustomed to thinking about creative uses of pen based computing systems in their personal and professional lives; however, I am willing to wager that the typical reader has given much less thought to how such technology can be used in the classroom. I am also willing to wager that this will soon change! To see why pen based computers and the classroom are a natural marriage, one need only to reflect on the content of a typical classroom blackboard. Whether the blackboard is found in a grade school, a high school, a college, or in a corporate training center, its surface is likely to be covered with a combination of sketches, graphs, diagrams, and informal notes, especially when the topic under discussion involves ideas from science, technology, mathematics, or other domain specific areas. When these ideas are presented with technology instead of with chalk, it is easy to see that the use of a stylus is more appropriate than a keyboard or mouse as the primary input device. Earlier issues of this magazine have reported on Palm devices' potential to impact classroom activities (see the Palm OS column in the November, 2001.) In this article we focus instead on the use of larger pen based devices in the classroom setting. We illustrate our ideas by showing how work done over the last few years at DePauw University demonstrates that these devices can help teachers and students communicate efficiently, and can increase interaction in the classroom.

Over the last few years we have taught several classes in a pen based computing classroom at DePauw University. The classroom houses one pen based instructor station and sixteen pen based student stations as shown in the picture to the right. Each of these stations is equipped with a PC that uses a 1024x768 resolution, flat panel, pen based video tablet as its display device. We are currently using WACOM PL-400 tablets, but we are in the process of transitioning

to the newer, larger (15" diagonal), brighter, and less costly, WACOM Cintiq tablets. In addition to allowing pen-based input, a benefit of the video tablets is that they can be adjusted so that they lie nearly flat on the desktops. This makes it easier to write on the tablets, and also improves lines of sight by allowing the students and teacher to see each other clearly without having to peer around a desktop monitor as is common in many traditional electronic classrooms and computer laboratories.

The teacher's station is attached to a video tablet as well as to a rear projection, touch sensitive, electronic whiteboard that

use a finger or a stylus to draw directly on the surface of the board as an alternative to writing on the video tablet.

Our classes are supported by a locally developed software system named DEBBIE, which stands for DePauw Electronic Black Board for Interactive Education (the system is patent pending.) DEBBIE allows the students and teacher in a pen-based electronic classroom to share written information during class. For example, when using the system, the teacher can extemporaneously draw freehand sketches directly on the surface of the teacher-station's video-tablet or electronic whiteboard. The



is located at the front of the classroom. We are currently using a board manufactured by SMART Technologies, Inc. that is approximately five feet wide. In our classroom the projection system actually sits behind the room's front wall so that the display surface of the electronic whiteboard is flush with the standard (non-electronic) whiteboards that flank it on each side (see picture on top). Since the electronic whiteboard is touch sensitive, the teacher can

teacher can also use a keyboard to type material, and can import material that was prepared ahead of time for use during class. All information sketched, typed, or imported by the teacher is transmitted over a network so that it appears on each student's video tablet. Each student can write freehand on his or her display to make private annotations directly alongside the teacher's material. Thus, the students can take their own notes without the burden




of having to copy down everything the teacher writes.

During class, the teacher can import portions of a student's workspace for viewing and discussion by the entire class. Because of this, class sessions tend to unfold as highly interactive activities. In a typical scenario the teacher first uses the electronic whiteboard to present new material to the class, and then asks the students to sketch answers to problems that are related to this material. The teacher then uses the system to share some or all of the student's answers with the class, responds to questions about these answers, offers alternative solutions, and determines if the class is ready for new material in which case the cycle repeats. Displaying student solutions electronically is especially helpful in science, mathematics, and technical classes since material in these classes often depends heavily upon diagrams, graphs, formulae, and other objects that are difficult to express orally or with typed words. As an example, consider figure 2, which shows a student's answer to a typical question in a course that deals with the mathematical foundations of computer science. Clearly it would be very hard for

a student to answer this question orally; in this case a picture truly is worth a thousand words.

Additional features of the system include the ability to replay a section of the notebook stroke by stroke. For example a chemistry teacher might illustrate how two molecules interact by first drawing some bonds, then erasing a bond and redrawing it in a new position, or an instructor of Japanese might show how to draw a Kanji character stroke by stroke (the stroke order is very important when writing Kanji). In each case, the teacher or students could then replay the diagram to review how it had evolved. Similarly, the teacher can replay diagrams drawn by students in order to see how a student's idea evolved. The system also allows the user to import previously prepared graphics in a variety of standard file formats. For example, an art history teacher might import an image of an important painting, while a biology teacher might import an image showing the anatomy of human hand. In either case the student or teacher could mark up the diagrams during class. After class the electronic notebooks can be saved or printed for review.

Reaction to the system has been positive, with students reporting through anonymous written surveys that they find the approach to be beneficial. In particular, they report a benefit from sharing their work with others during class, and a belief that they are paying more attention during class as a result of the interactive environment. One student recently commented, "The level of interaction in this class is more than I have experienced in any other class. There is a lot of interaction between the students, the teacher, and us that has been very valuable. I don't think this could have been achieved outside of the DEBBIE classroom." Another wrote: "Many times [in a regular classroom] I find that I do copy notes mindlessly. Here I don't have to, so I can maintain focus." With reaction like this, I am willing to wager that pen-based computers will soon be coming to a classroom near you. 

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Five pens in one. To think that one day not long ago man wrote with a goose feather.



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# TABLET PC Q&A

compiled by geoff walker, technology editor



## EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT THE TABLET PC:

This article consists of a set of FAQ (frequently asked questions) about the Tablet PC. The 64 questions have been gathered from many sources, including other articles, product reviews, conferences, trade shows, emails, online forums and personal meetings. The questions are organized into eight groups.

### Tablet PC Market

**Question:** *Is the Tablet PC going to be successful?*

**Answer:** It has a good chance, but it's not a slam-dunk. Many things can go wrong, for example: OEMs may not do a good job making the pen easy to use; convertible hinges may not be reliable; the technology market may remain in recession for the next year or two (the majority of Tablet PCs in the next year or two will be purchased by IT, not by individual users); the incremental cost of a Tablet PC over an equivalent ultraportable notebook may be too high; handwriting recognition may not work well enough; note-taking may be too difficult due to user interface issues, and so on. The saving grace is that Microsoft seems to be very committed to XP Tablet, enough to ensure that they get at least to Version 3, so there will be time enough to get beyond many of these risks and to work through many potential problems.

**Question:** *Will both form factors (convertibles and "pure" tablets) be equally successful?*

**Answer:** Tablet PCs will be sold into both vertical and horizontal applications. Vertical applications such as healthcare, insurance, government, and sales force automation tend to be more demanding in terms of

factors such as durability, use while standing and outdoor use. These requirements will tend to drive vertical applications towards pure tablets (the slate form-factor) rather than convertibles because pure tablets are more durable (shock-mounted hard drives), lighter (no keyboard, no hinges, less housing surfaces) and more suited for indoor-outdoor use (transflective screens). Few of today's vertical applications require an embedded keyboard; access to a keyboard via a docking station or a "portfolio-style" carrying case is usually sufficient. Horizontal enterprise applications tend to be less demanding with regard to most of these factors, and users tend to require an embedded keyboard so they can enter any quantity of text at a moment's notice, without having to suffer the delays of handwriting recognition, locate a docking station or fumble with a portable desk stand and a USB keyboard. This will tend to drive horizontal enterprise applications towards convertibles. In general, the horizontal enterprise market is much larger than the vertical market, so convertibles have a much higher potential sales volume than pure tablets.

**Question:** *How many Tablet PCs will be sold in 2003?*

**Answer:** IDC's latest forecast is that Tablet PCs will account for around 2% of the total laptop

market in 2003, which will be about 600K units. IDC believes that the majority of units sold in 2003 will be pure tablets in vertical applications, due to slow qualification of XP Tablet by IT in horizontal applications.

**Question:** *When will Dell, Gateway and IBM start selling Tablet PCs?*

**Answer:** Dell, Gateway and IBM probably won't start selling Tablet PCs until the Tablet PC becomes an established category of notebook, like ultraportables are today. It's likely to take at least two to three years to get to that point.

**Question:** *Will Tablet PCs be sold to consumers?*

**Answer:** None of the OEMs building the first generation of Tablet PCs are explicitly targeting consumers. All of Microsoft's positioning for the Tablet PC is based on horizontal enterprise and vertical applications. Of course, there will always be some "early adopter" consumers who purchase a Tablet PC because they have to have the latest computer gadget. Eventually, in five or more years, the Tablet PC may become as much of a consumer product as general-purpose notebooks are today.

### Microsoft Strategy

**Question:** *Microsoft has been promoting Tablet PCs for almost two years (since Comdex 2000), yet none are available for sale today (two months away from Comdex 2002). Why is it taking so long?*

**Answer:** Microsoft approached the Tablet PC as a true R&D project. They built a unique hardware prototype, used it to understand the issues of building a keyboardless computer, and then did an extraordinary amount of user studies and research. Then, after all that, they started development of XP Tablet, a completely new version of the Windows XP operating system that includes digital ink as a new data type. They've been talking about this project since they started. This extended development cycle is very different from that of some other Microsoft products, such as Mira (a wireless monitor for home PCs), where creating the product didn't require any significant amount of new development, just some tweaking of existing products.

**Question:** *Isn't the Tablet PC just another attempt to get the PC industry out of the current slump?*

**Answer:** Microsoft started the Tablet PC project in August 1999, long before the current slump began. The Tablet PC is in fact only one aspect of a multi-faceted Microsoft effort to increase the value of a PC by increasing the amount of time that it is used. In recent speeches, Steve Ballmer (CEO of Microsoft) has said he wants everyone to "use PCs 16 hours a day." This isn't meant to be taken literally with regard to today's PCs; Ballmer means that he wants the PC to be useful for watching movies, writing letters, fixing your car, listening to music, doing work, playing games, taking notes... throughout your waking hours. Getting corridor cruisers to switch from taking notes in spiral-bound notebooks to taking notes on a Tablet PC is a step in this direction.



**Question:** What caused Microsoft to create the Tablet PC now?

**Answer:** Microsoft believes that notebook hardware is finally ready to allow the creation of an exceptionally mobile product, unlike in the early 1990s, when it definitely wasn't. Current notebook hardware enables products such as the Toshiba Portege 2000 (750 MHz, 12.1" XGA, 256 MB, 20 GB, 10/100 Ethernet, wireline modem, integrated WiFi, XP Pro, 2.6 pounds, 9" x 11.4" x 0.73", US\$1,999). This is well within Microsoft's target profile for a Tablet PC. Except for battery life, of course – the Portege 2000 gets only 1.5 hours of battery life. Toshiba could have added another 4 ounces of battery and doubled the battery life into a realistic range, but then the product wouldn't be so thin and light. Specsmanship often wins over usability in the notebook market.

**Question:** Microsoft recently started calling Tablet PC users "information workers," while previously they called them "knowledge workers." Why did Microsoft change?

**Answer:** This switch occurred in Jeff Raikes' (Microsoft Group VP) PC Expo 2002 keynote speech. The point he made was that vertical users such as nurses, pilots and sales people are actually knowledge workers – they're part of a company's information flow. To ensure that Microsoft didn't alienate vertical markets with their strong focus on the horizontal enterprise applications of Tablet PCs, Raikes lumped both vertical and horizontal users together as "information workers."

**Question:** Why does Microsoft tend to closely associate the Tablet PC with wireless?

**Answer:** It's a result of the increased mobility that the Tablet PC brings to notebooks. You're likely to use a Tablet PC in more places than a standard notebook. Microsoft's own internal use of Tablet PC prototypes showed them that once you have a Tablet PC (a convertible notebook) instead of a paper notebook in a meeting, wireless access to the company's net-

work becomes much more important. Microsoft's emphasis on wireless in the Tablet PC is therefore almost exclusively focused on WiFi (802.11b) from the corridor cruiser's point of view.

**Question:** During most of 2001, Bill Gates seemed to be pushing a slate design, but now whenever I see Microsoft demoing a Tablet PC it's a convertible. Why did Microsoft change?

**Answer:** According to Microsoft's primary Tablet PC architect, when Microsoft first decided to build their own hardware prototype, they debated whether to build a pure tablet or a convertible. They decided to build a pure tablet to ensure that their own developers would take a very serious approach to the development of digital ink and the problem of using Windows with just a pen. Even then, Microsoft believed that the convertible would be the most popular form-factor for the Tablet PC. Between Comdex 2000 and Comdex 2001, the Microsoft slate prototype was the only Tablet PC hardware available. Microsoft's positioning during that period was that the Tablet PC was "the evolution of the laptop," implying that users were somehow going to evolve beyond their keyboards into a world where an extremely light and thin pure tablet could replace a notebook. The press saw this and published a lot of "I don't think so!" stories about the Tablet PC during 2001. Then at Comdex 2001, Acer showed the prototype of their TM-100 convertible Tablet PC. Microsoft never looked back. Every demo, conference and trade show that Microsoft did from that time on used the Acer (although other

pure tablet prototypes were available, such as Fujitsu's). After Comdex 2001, Microsoft changed the Tablet PC positioning to "a superset of the laptop" – you can't be a superset if you don't have an embedded keyboard! Now, ten months later, most of the press has caught on to the idea that convertible Tablet PCs will be the mainstream form-factor, and pure tablets will remain in the realm of vertical applications.

**Question:** Will Microsoft ever sell the Tablet PC "slate" they showed during most of 2001?

**Answer:** No, it was developed purely for their own internal research purposes.

**Question:** Why does Microsoft require Tablet PCs to be legacy-free (no serial, parallel, PS/2, game or FDD ports)? I need some of those ports on my notebook!

**Answer:** Microsoft has been trying to get rid of legacy ports in all PCs since about 1997. Legacy ports make it difficult to ensure the stability of the OS, since they're not plug-and-play like more modern I/O standards such as USB and FireWire (IEEE-1394). Eliminating legacy ports makes it much easier to achieve "surprise undocking" (where the user doesn't have to notify the OS that he intends to undock the PC). Since Microsoft originally conceived of the Tablet PC as an entirely new class of device (not just an enhancement to notebooks), they were able to lay down the law for the new device class and specify that it must be legacy-free. It should be noted that docking stations are readily available today for under \$100 that can convert USB

into all of the legacy ports – for an example, see [www.com-pusb.com](http://www.com-pusb.com).

## Applications

**Question:** What's the advantage of using a Tablet PC to take notes in a meeting instead of using a notebook PC or plain old paper?

**Answer:** In most meetings, it's considered rude to use a notebook PC. The screen acts as a barrier between you and the other meeting participants, and the sound of typing on a keyboard is annoying. A Tablet PC can be used in your lap or on the tabletop to take notes just as if it was a paper notebook. The advantage is that notes taken in digital ink can be stored, searched, converted to text, or transmitted to others much more easily than notes on paper. When you have a Tablet PC with you in the meeting, you have immediate access to all of your files. If the meeting room has a WiFi network, you have access to the company network (and probably the Internet). If the meeting is boring, you can write and send ink emails without disturbing others – it just looks like you're taking notes.

**Question:** Office XP already includes handwriting recognition, so what does the Tablet PC add when I'm using Office?

**Answer:** The "Office Pack" adds some amount of ink integration to Office XP when used on a Tablet PC. The degree of integration is relatively limited in the first version of the Office Pack, and it depends on the particular Office application. In PowerPoint, slides can be annotated in ink; in Word, ink "comments" can be added in the right margin (but annotations on top of re-flowable text are not supported); in Outlook, ink emails can be sent and received. In Microsoft Journal, the note-taking utility, ink notes can be converted into Outlook Tasks or Calendar entries, or sent as emails. In Excel, ink is not supported directly – although the pen can be used to enter or edit spreadsheet cells via the Tablet PC Input Panel (TIP), just like in any

Table 1: Software Company Products Enhanced for Tablet PC

|                                 |   |
|---------------------------------|---|
| Adobe                           | Network publishing solutions                    |
| Allscripts Healthcare Solutions | Point-of-care decision support for physicians   |
| Autodesk                        | Computer-aided design solutions                 |
| Corel                           | Graphics and business productivity applications |
| Eclipsys Technologies           | Clinical information technology for hospitals   |
| ESRI                            | Geographical information                        |
| FranklinCovey & Agilix Labs     | Personal time management and productivity       |
| Groove Networks                 | Web-based collaboration solutions               |
| HanWang Technology              | Chinese character recognizer                    |
| LexisNexis                      | Decision support and research solutions         |
| Microsoft (Office XP & Visio)   | Office productivity and business diagramming    |
| SAP                             | Enterprise resource planning                    |
| WebEx Communications            | Multimedia communications                       |
| Zinio Systems                   | Digital magazine technology and services        |



other Windows application. Microsoft has said they will add substantially more ink integration in future versions of Office.

**Question:** What's the "killer app" for the Tablet PC?

**Answer:** So far, a true "killer application" for the Tablet PC hasn't surfaced (it's really too early, since no Tablet PCs have shipped yet). The author's opinion is that the three most important applications for the Tablet PC will be (a) note-taking, (b) editing and annotating Office documents, especially those containing graphics, and (c) group collaboration using software such as that from Groove Networks. Note that these are all horizontal enterprise applications.

**Question:** How will vertical applications make use of the Tablet PC's capabilities?

**Answer:** Few vertical applications on pen tablets today make use of either handwriting or ink. Vertical applications are generally designed to make heavy use of menu selections, check boxes, radio buttons and other forms of graphical user interface elements, rather than handwriting recognition. If a vertical application does support handwriting, it's typically used only for very limited data entry, such as quantities, drivers license numbers or names and addresses. Since the handwriting recognizer in the Tablet PC doesn't offer a major improvement over the recognizers currently in use, vertical applications are not likely to increase their use of handwriting. The most common use of ink in current vertical applications is signature capture – but that's just capturing a bitmap of the signature, not treating it as digital ink. A few vertical applications today make use of "ink notes" to store user notations; the Tablet PC's digital ink capability will probably cause this usage to expand considerably. The bottom line is that the Tablet PC won't have a very large impact on vertical applications. It offers only a small incremental improvement.

**Question:** At a trade show, I saw an application called "Snippit" for the Tablet PC – what is it?

**Answer:** "Snippit" is a Microsoft "Power Toy" (unsupported application) that allows you to use the pen to outline any part of a webpage, add annotations, and email the fragment to someone. It's a cool tool, but since it's unsupported, it's unlikely that enterprise will incorporate it into any formal Tablet PC applications. It's just something that Microsoft hopes will increase the value of a Tablet PC to a horizontal enterprise user.

**Question:** Will reading an e-book on the Tablet PC be any different than on a regular PC?

**Answer:** Microsoft developed an enhanced version of the Reader specifically for use on the Tablet PC. The enhanced version has an improved user interface that makes the process of reading more natural. The new Reader also allows fine control of the font size, to allow the user to adjust the reading experience exactly to their liking.

**Question:** Are Tablet PCs good for reading magazines?

**Answer:** Zinio Systems, one of Microsoft's Tablet PC software partners, began offering digital magazine subscriptions (along with a very slick reader) in the second quarter of 2002. Zinio plans to enhance their reader software to take advantage of ink annotation and other Tablet PC capabilities. However, in the author's opinion, the resolution of Version 1 Tablet PC screens (XGA = 123 dpi on a 10.4" screen or 106 dpi on a 12.1" screen) isn't high enough to allow comfortably reading a full magazine page without zooming. Zooming makes reading much harder, since it requires frequent scrolling to follow the text (and occasional un-zooming to regain a sense of where you are on the page). The highest resolution available today on a laptop screen (UXGA = 142 dpi on a 14.1" screen) is just barely good enough to allow un-zoomed reading for any length of time without eye fatigue.

**Question:** Does the Tablet PC include voice recognition?

**Answer:** The Tablet PC includes Microsoft's voice recognizer. The

author was impressed with the recognition accuracy on "normal" text after only ten minutes of training. Complex text that included quotes, acronyms and technical words was not recognized as well. While most Tablet PCs will have built-in microphones, getting good performance from any speech recognition software (Microsoft's or anyone else's) requires using a USB headset microphone.

**Question:** Is there any integration between the pen and voice on a Tablet PC?

**Answer:** Yes, the two input methods can be mixed indiscriminately. For example, you can dictate text, write a few words, and then continue dictating. The pen can be used to correct voice input, and voice can be used to correct pen input. Pen and voice are surprisingly well integrated in XP Tablet.

**Question:** Will there be special versions of some Windows applications for the Tablet PC?

**Answer:** Yes, a number of software firms have announced that they will be offering new versions of their applications that have been enhanced to take maximum advantage of the Tablet PC's capabilities. In most cases, this amounts to full integration of digital ink. (See Table 1 for a list.)

**Question:** From the perspective of a vertical application user such as a nurse or an insurance adjuster, how does using a Tablet PC differ from using an existing pen tablet?

**Answer:** It doesn't. As noted elsewhere in this Q&A, a Tablet PC's hardware is very similar to current pen tablets, and neither digital ink nor improved handwriting recognition will make much difference in vertical applications in the short term. The real difference is that Windows XP Tablet is fully supported by Microsoft – which should make quite a bit of difference to IT (in reducing risk in implementing vertical pen-based applications), but little difference to the end user.

**Question:** I currently use Adobe

*Illustrator on a Wacom desktop tablet connected to my laptop. Can I simply install Illustrator on a Tablet PC and get all the same functionality?*

**Answer:** Yes, except that pen pressure won't be available. Not all Tablet PC pens support pressure. Even if they did, the pen interface standard defined by Microsoft (Human Interface Device, or HID) is incompatible with the pen interface standard that's been in use on Wacom tablets for many years (Wintab). The only place pen pressure is guaranteed to work on a Tablet PC is in the Microsoft Journal utility. In the short term, the active digitizer companies may provide a software translation layer to get around the incompatibility problem; in the long term, the graphics software vendors will probably update their products to support Microsoft's HID interface.

**Question:** Is Microsoft Journal basically the same idea as Aha Software's InkWriter (from the mid-1990s)?

**Answer:** They're somewhat different in their basic concept. InkWriter was designed as an "ink word processor." When you added a word into an ink sentence in InkWriter, the ink would automatically wrap (reflow) to a new line. This looked cool, but it actually made taking notes harder, since you couldn't combine text and graphics without having their relative positions change in unpredictable ways. Journal, on the other hand, is a note-taking utility that emulates real ink on paper. Real ink never changes by itself. You can draw circles around words and draw arrows pointing to words with the certainty that the words won't move by themselves. However, if you want to insert space (additional lines) in a notes document, you can do it easily in Journal – something that you can't easily do with regular notepaper.

**Question:** Is the Tablet PC a realistic business tool, or just a cool gadget?

**Answer:** In vertical applications, the Tablet PC (in the form of a pen tablet) has been a realistic



business tool since the late 1990s. There are hundreds of thousands of pen tablets in mission-critical applications in Fortune 1000 companies. Pen tablets produce measurable ROI in the form of increased competitiveness, improved customer satisfaction, enhanced patient care, improved sales rep productivity, etc. In horizontal enterprise applications, only time will tell whether the Tablet PC will become a realistic business tool. Largely it will depend on what happens with digital ink. If Microsoft follows through with expanded support for digital ink in Office and expands the support for digital ink in other versions of Windows, if ISVs develop note-taking applications that far outstrip the basic capabilities of Microsoft's Journal, if Groove Networks' software is a hit and web-based group collaboration becomes a must-do activity in enterprise, if... if... if... then the Tablet PC may become as important in the horizontal enterprise as standard notebooks are today. However, it's not a sure thing!

## Handwriting Recognition

**Question:** How well does the Tablet PC's handwriting recognition work?

**Answer:** It depends very much on the user. Some users get 95% word accuracy or better (one word wrong in 20), while other users, using exactly the same hardware and software, get 60% word accuracy (eight words wrong in 20). Often there's no obvious difference between the handwriting of the two users; it often looks equally bad or equally good. Even someone with exceptionally clear handwriting may not achieve good accuracy. If you're in the 60% group, you would say that handwriting recognition doesn't work at all.

**Question:** Does the recognizer work equally well with cursive and printing?

**Answer:** The recognizer works with both, but it seems to have a definite bias towards cursive (i.e., the recognition rate seems better with cursive). A character

recognizer can be brought up in the Tablet PC Input Panel (TIP), but it really doesn't make much sense to do Graffiti-style recognition on a Tablet PC.

**Question:** Can I train the handwriting recognizer in the Tablet PC so that it knows the way I write characters? If not, can I at least select the character shapes that I want to use, the way I can with Transcriber on the Pocket PC?

**Answer:** No. The Tablet PC's handwriting recognizer cannot be trained. If you're in the "60% group" (see above), you have to figure out what it's looking for by trial and error (for example, by writing a capital letters several different ways and seeing which way is recognized more often), and then modify your own handwriting so that it matches what the recognizer wants. If there's enough negative feedback about this from the market, Microsoft may add a training capability in the future.

**Question:** Does the handwriting recognizer use a dictionary?

**Answer:** Yes. Conscientiously adding words to the dictionary (including any technical words or abbreviations that you use regularly) will improve the recognition rate.

**Question:** Can I search my digital ink note files for keywords?

**Answer:** Yes, but searching depends on good handwriting recognition. When you take notes in Microsoft's Journal utility, recognition takes place in the background as you write, and lists of possible recognized words are stored in the digital ink's property records. When you search for an ink word, these recognized words are what are actually searched. If your handwriting does not have a high recognition-accuracy rate, searching ink simply won't work for you. To some people, this substantially reduces the value of taking notes on a Tablet PC.

**Question:** Is the handwriting recognizer in the Tablet PC entirely Microsoft-developed, or did Microsoft purchase it from someone else?

**Answer:** Microsoft's recognizer is a "fusion" (blend) of their own internally developed code (which started as the MARS recognizer in Windows for Pen Computing in 1991 and evolved over 10 years of development), and the Calligrapher recognizer from Paragraph, the rights to which Microsoft purchased in 1999.

**Question:** In promoting the Tablet PC, Microsoft has been de-emphasizing handwriting recognition and emphasizing "ink as ink." Does handwriting recognition really matter?

**Answer:** Nobody is likely to write "the great American novel" using handwriting on a portable computer – writing by hand is simply too slow. However, handwriting recognition is important if you want to take notes in ink and then be able to search them later (see above). It's also important if you want to be able to enter a note in Journal and send it to Outlook as a task, or similar activities. If you never want to search ink notes, and all you want to do is send ink emails and enter an occasional file name, then even terrible handwriting recognition is tolerable.

**Question:** Isn't a keyboard always faster than handwriting?

**Answer:** Yes, for most people a keyboard is faster than handwriting. But there may be times when you just can't use a keyboard, such as in a meeting, or in a confined space such as a middle coach airline seat. In these situations, the ability to handwrite information and have it converted accurately into text is a benefit.

## Digital Ink

**Question:** What is "digital ink"?

**Answer:** Digital ink is another term for "ink as a data type." To understand what this means, consider what happens when you type text into Microsoft Word. The ASCII characters that make up the text are stored in a doc file, along with property records that define the font size and color, the author of the text, the path name of the file, when it was created, and a host of

other information. Digital ink is the same concept, except instead of ASCII characters, the series of digitizer points that make up each continuous pen stroke are stored in the file. Digital ink's property records can include per-point properties such as pressure, per-stroke properties such as color, global properties such as text equivalents, and unique application-defined properties.

**Question:** How does digital ink differ from the way ink is handled on existing pen tablets?

**Answer:** In most pen tablet applications today, ink is stored as a bitmap. Bitmaps take up a lot of storage space, and they're hard to edit. Ink in a bitmap doesn't have any property records; it's just a series of pixels – it isn't very useful.

**Question:** Is the Tablet PC's digital ink compatible with applications on other operating systems such as Windows 2000?

**Answer:** When a Tablet PC user sends digital ink to a non-Tablet PC user (e.g., as an ink email), XP Tablet converts the digital ink into a TIFF file before sending it. This is better than a bitmap, because it's compressed, but not much. The receiving user can't do much with a TIFF file other than read it.

**Question:** Will Microsoft ever include digital ink support into other versions of Windows?

**Answer:** It's possible. If Microsoft really wants to make digital ink significant in the PC world at large, they will have to broaden the use of digital ink beyond just the Tablet PC.

**Question:** Does true digital ink exist in other places than the Tablet PC?

**Answer:** Yes, other companies have developed applications that create and use digital ink (in a different format than Microsoft's, of course). One of the best examples is riteMail, a multi-platform, multi-language, interactive, handwritten email application from Pen&Internet, a division of Parascript (see <http://www.penandinternet.com>).



## XP Tablet

**Question:** *Isn't XP Tablet just some files added on top of XP Pro, like Version 1 of "Windows for Pen Computing" was some files added on top of Windows 95?*

**Answer:** No, XP Tablet is actually an entirely separate version of Windows XP. There is as much or more difference between XP Pro and XP Tablet as there is between XP Home and XP Pro.

**Question:** *Can I buy a copy of Windows XP Tablet and run it on my standard notebook with a Wacom desktop digitizer tablet?*

**Answer:** No, Version 1 of XP Tablet is only available through OEMs, delivered on new Tablet PC hardware. Microsoft is doing this to ensure a good user experience. Version 2 of XP Tablet will be available as an upgrade (for owners of existing Tablet PC hardware), and may be available for installation on other hardware.

**Question:** *Will XP Tablet cost more than XP Pro?*

**Answer:** Yes, the OEM cost of XP Tablet is rumored to be around \$25 more than XP Pro. This cost is part of the \$200 incremental price of a Tablet PC over an equivalent ultraportable notebook.

**Question:** *Does XP Tablet include enhanced power management?*

**Answer:** No, XP Tablet uses exactly the same power management as XP Pro. When Microsoft talks about the "exceptionally long battery life" of Tablet PCs, they are relying on the OEMs to produce hardware that has very low power consumption. In reality, most Tablet PCs will have around the same battery life as an equivalent ultraportable notebook.

**Question:** *Can I take an old (Windows 98) application and run it with a pen on the Tablet PC?*

**Answer:** Yes. One of Microsoft's primary goals for XP Tablet was the ability to run any existing Windows software. The primary

user interface element that allows using the pen with any Windows application is the Tablet PC Input Panel (TIP). This is a "writing window" where the user writes ink. XP Tablet recognizes the ink, converts it into text and outputs characters that the application sees as coming from a keyboard.

**Question:** *Will the Tablet PC features eventually migrate into all the other classes of notebooks ("thin and light," "desktop replacement," etc.)?*

**Answer:** Microsoft believes that will happen with five years, but it's not clear that putting a pen in much larger, heavier notebooks makes a lot of sense. It depends largely on what Microsoft does with digital ink—that is, how much motivation there is for all notebook users (not just ultraportable users) to use digital ink.

**Question:** *Is the Tablet PC usable by left-handed people?*

**Answer:** Yes, the Control Panel for the pen has special settings for left-handers that cause menus to fly out to the right instead of the left (the default for right-handers).

**Question:** *Can a Tablet PC run Linux?*

**Answer:** The hardware can certainly run Linux, but then it wouldn't be a Microsoft Tablet PC—it would be a Linux pen tablet. The main issue in running Linux on a Tablet PC is the availability of a pen driver. Given the nature of the open-source community, it is extremely likely that a Linux pen driver will appear on the web shortly after launch of the Tablet PC.

**Question:** *Isn't IT very reluctant to rapidly adopt a new Microsoft OS such as XP Tablet?*

**Answer:** Yes, and that reluctance is probably going to be the greatest single impediment to growth of the Tablet PC during 2003. Most Tablet PCs in 2003 will be purchased by IT (Information Technology departments), not by individuals, so IT's willingness (or lack thereof) to adopt XP Tablet is very important. The current adoption of XP

Pro in enterprise notebooks (e.g., those used by road warriors) is less than 10% (Windows 2000 is the standard). The forecasted adoption of XP Pro on enterprise notebooks in 2003 is less than 20%—and this is after the release of XP Service Pack 1. (IT is historically unwilling to adopt any new Microsoft OS until after the release of SP1 for the new OS, at the very earliest.) Tablet PC OEMs who offer Windows 2000 on Tablet PC hardware are more likely to be successful in 2003 because they can offer IT a software migration path. Those OEMs who don't offer Windows 2000 on Tablet PC hardware may find it very difficult to sell more than a few thousand Tablet PCs in 2003.

## Hardware

**Question:** *What brands of Tablet PCs will be available by the end of 2002?*

**Answer:** See Table 2. The information in this table is based on prototypes shown at trade shows, verbal information gathered at trade shows, and press announcements. It may not be 100% accurate. Some of these companies may not start shipping their Tablet PCs until early 2003.

**Question:** *I've read that Tablet PCs will be very expensive, around \$2,500, or \$1,000 more than the cost of an average notebook. Is that correct?*

**Answer:** A Tablet PC is basically an ultraportable-class notebook with a pen. The price of most Tablet PCs will be based on the underlying ultraportable notebook design, plus around \$200 for additional Tablet PC-specific hardware and Windows XP Tablet. Ultraportable-class notebooks (defined as notebooks with a 10.4" or 12.1" screen, weighing around 3 pounds and around 1" thick,) average around \$2,000 today with 256 MB of RAM and a 20 GB hard drive. (This compares with an average of around \$1,500 for a "thin-and-light" class notebook, which is what most people think of as an "average" notebook.) Acer has already announced that the price of their TM-100 Tablet PC convertible will be US\$1,999. The

street price of HP's ultraportable notebooks (the Compaq EVO N200 and N400) ranges between \$1,500 and \$2,000; the expected street price of HP's Tablet PC should therefore be between \$1,700 and \$2,200. The street price of Toshiba's Portege 2000 is around \$1,900; adding \$200 brings the expected street price of Toshiba's Tablet PC to around \$2,100. The bottom line is that Tablet PCs are expected to cost about \$200 more than an equivalent ultraportable notebook, or somewhere in the range of \$1,700 to \$2,200, depending on the vendor.

**Question:** *Why does the Tablet PC use a special pen? Is there any alternative if I lose it?*

**Answer:** The Microsoft specification for the Tablet PC requires OEMs to use an active (electromagnetic) digitizer, in order to achieve very smooth and detailed ink. An active digitizer requires a pen that contains electronics. The Tablet PC cannot be used with any other pen. If you lose the pen, you're out of luck if you don't have a spare. That's why some Tablet PC OEMs are including two pens with their products.

**Question:** *Isn't the single rotating hinge on a convertible Tablet PC inherently more fragile than the two hinges on a standard notebook?*

**Answer:** The rotating hinge itself is typically a solid chunk of metal, designed to be very reliable for 30,000 or more cycles. Convertibles in the early 1990's often failed because of the flat video cable running through the hinge. In the latest convertibles, round shielded cable is used which should eliminate cable failures. The most serious potential problem area is the attachment of the hinge to the typical plastic computer housing. Only time will tell if the OEMs' designs in this area are good enough to withstand the usage of a highly mobile PC.

**Question:** *I tried a Tablet PC at a trade show, and it felt like I was writing on ice (very slippery). Why can't the feeling of the pen on the screen be made more like pen on paper?*



**Answer:** The feeling of the pen on the screen is controlled by two variables: (a) the texture on the glass or plastic covering the screen (i.e., the writing surface), and (b) the material of the pen tip. Some of the Tablet PC OEMs haven't figured out yet how to adjust these two factors to produce the desired "pen on paper" feeling. One company who has figured this out is A.T. Cross (the famous pen company); they've actually got a patent on a method of producing a very natural "pen on paper" feeling with an electronic pen.

**Question:** Compaq (now part of HP) recently announced that they're using a Transmeta CPU in their Tablet PC. Does the brand of CPU really matter in a Tablet PC?

**Answer:** Microsoft's vision of a Tablet PC includes very long battery life. There are only two brands of CPUs being used in the initial Tablet PCs – Intel and Transmeta. Intel CPUs (used in almost all ultraportable notebooks today) tend to favor performance over battery life. Transmeta CPUs tend to favor battery life over performance (an 800 MHz Transmeta CPU is roughly equivalent to a 600 MHz Intel CPU in actual performance). In addition, a Transmeta CPU is significantly lower cost than an Intel CPU, which may be reflected in the selling price. All things equal, a Tablet PC that uses a Transmeta CPU could get up to 10% more battery life and cost up to 5% less..

**Question:** Will all Tablet PCs have integrated WiFi (802.11b) wireless?

**Answer:** Every Tablet PC can support WiFi in some way. Some Tablet PCs will include integrated WiFi as standard, some will offer it as an option, and some will rely on user-installed WiFi PC Cards.

**Question:** Will Tablet PCs have screens that are readable outdoors as well as indoors?

**Answer:** It's likely that one or more of the rugged Tablet PC OEMs will introduce a product with a transreflective (indoor-outdoor) screen. None of the larger

OEMs (e.g., HP or Fujitsu) is expected to introduce a transreflective screen in Version 1 of Tablet PCs. The difference is that smaller, more specialized OEMs are willing to modify standard transreflective LCDs to insert an active digitizer grid, while larger, high-volume OEMs prefer to use off-the-shelf LCDs that incorporate a pocket for the digitizer grid. There aren't any transreflective LCDs on the market today that have a pocket.

**Question:** Can a Tablet PC run Windows CE, like a webpad?

**Answer:** Tablet PC hardware cannot run Windows CE. Tablet PCs are full-scale Windows notebooks. Tablet PC hardware is capable of running Windows 95, 98, NT4, 2000 or any of the three versions of XP (Pro, Home, or Tablet) – although many Tablet PC OEMs plan to offer only XP Tablet.

## Comparison with Other Devices

**Question:** What's the difference between Tablet PCs and existing pen tablets?

**Answer:** The two main differences are the active digitizer and the absence of legacy ports. Most existing pen tablets use resistive (touch) digitizers, and they all have legacy ports (serial, parallel, PS/2, etc.). The Tablet PC's "surprise undocking" requirement is difficult to meet with existing pen tablets because of legacy ports. Most existing pen tablets meet or come close to meeting the Tablet PC power management requirements (resume in five seconds, etc.), and screen rotation is an option on many existing pen tablets. Some Tablet PCs may be slightly thinner or lighter than existing pen tablets, but the difference isn't very significant (a few millimeters and/or a few ounces). The bottom line is that there really isn't much difference. Tablet PCs are slightly evolved pen tablets.

**Question:** What are the main differences between a Tablet PC and an equivalent ultraportable notebook?

**Answer:** For a convertible Tablet PC, the main differences are the active digitizer and the rotating screen hinge. (Note that some ultraportable notebooks are already legacy-free.) For a pure Tablet PC, the main differences are the active digitizer and the lack of an internal keyboard.

**Question:** Will Tablet PCs compete with PDAs?

**Answer:** No more than a notebook competes with a PDA. Tablet PCs are meant to be exceptionally mobile devices, so you may find that you carry your Tablet PC more often than you'd carry a standard notebook. However, a Tablet PC of any size isn't going to replace a shirt-pocket-sized PDA any time soon.

**Question:** Isn't the capability of a Tablet PC limited compared with a notebook?

**Answer:** Convertible Tablet PCs have greater capability than an equivalent ultraportable notebook because they have everything that a notebook has plus the ability to be used in tablet mode with a pen. Pure Tablet PCs have everything that a notebook has except an embedded keyboard. Instead, they require the use of an external keyboard (USB, IR or RF) or hunting-and-pecking on an on-screen keyboard. It can be argued that pure Tablet PCs therefore have less capability than a notebook because they can't easily be used with a keyboard in your lap in an airport.

**Question:** If I prefer typing to handwriting and I already have an ultraportable notebook with integrated WiFi wireless, why should I replace it with a Tablet PC?


**Answer:** You probably shouldn't right now. Wait until you're ready to upgrade your ultraportable notebook in a year or two (due to the availability of faster CPUs, larger hard drives, etc.), then consider whether the added value of a pen and digital ink is worth an incremental \$200. By that time, the \$200 delta may have dropped substantially, and more ultraportables may come with a pen and

Table 2: Tablet PCs Available in 2003

| Brand            | Form-Factor   | LCD   |
|------------------|---------------|-------|
| Acer             | Convertible   | 10.4" |
| Fujitsu          | Tablet        | 10.4" |
| HP               | Tablet        | 10.4" |
| Innolabs         | Tablet        | 10.4" |
| Motion Computing | Tablet        | 12.1" |
| NEC              | Tablet        | 10.4" |
| PaceBlade        | Tablet        | 12.1" |
| Toshiba          | Convertible   | 12.1" |
| ViewSonic        | Tablet        | 10.4" |
| WalkAbout        | Rugged Tablet | 10.4" |
| Xplore           | Rugged Tablet | 10.4" |

XP Tablet.

**Question:** Was the IBM TransNote a Tablet PC?

**Answer:** Technically, the IBM Transnote wasn't a Tablet PC because it didn't run XP Tablet. It was an ultraportable notebook with a touch digitizer on the screen for navigation (not for inking) and a separate active digitizer under a pad of paper beside the notebook for note taking while simultaneously creating digital ink. The TransNote was a unique device that won many awards for innovation. IBM discontinued it in early 2002 due to low sales (less than 25,000 units). It could be argued that IBM did a very poor job of marketing the TransNote – it was overpriced, incorrectly positioned, had the wrong resolution screen (SVGA instead of XGA), and was never promoted to any of the market segments likely to buy it (lawyers, insurance agents, etc.). For a detailed description of the IBM TransNote, see the Pen Computing website. 

Based in Silicon Valley, Geoff Walker is a consultant with Walker Mobile, LLC. Geoff has worked on the engineering and marketing of pen computers since 1989 at GRiD Systems, Fujitsu Personal Systems (now Fujitsu PC) and Handspring. He can be contacted at [geoff.walker@att.net](mailto:geoff.walker@att.net).



# PDA's at WAR

By Tedd Vodde

From the current handheld applications in the service to futuristic systems on the drawing board, handheld computers will play an ever-increasing role in our nation's defense.



The objective lies ahead. From ancient warfare to today, the objective is the high ground. And to take it with the least casualties on your side. Crouched in a foxhole, a sergeant reaches into his camouflaged pocket to pull out a key weapon, his handheld computer, to survey satellite photos and communicate with headquarters to coordinate the attack. Although ruggedized to survive the wear and weather of combat, the unit is not much different from the ones carried by business Road Warriors all over the world whose eye is on a different high ground, the coveted corner office.

After the devastating attacks of 9/11, the military response in Afghanistan was swift and overwhelming. Handheld computers played a greater role in military operations than ever before. From support services to combat on the front lines, handheld computers are becoming a key element of military life.

The USS McFaul, based out of Norfolk, Va., is a guided-missile destroyer designed to handle any high-density, multi-threat environment. The Navy selected the McFaul as a prototype for its IT-21 "Information for the 21st Century" program. This program seeks to equip Navy frontline ships and key bases with advanced data networks, high-speed satellite communications links, and top-of-the-line PCs. As one of the newest vessels in the US Navy's Atlantic Fleet Surface Force, the McFaul is outfitted with a full suite of IT-21 capabilities, as well as the world's most sophisticated information technology. The ship's technological advances were a key reason behind the Navy's choice to use it as the test bed for the latest in mobile and wireless technology.

Since success in battle relies on smooth logistics and instant communications, the crew need-

ed an easy and efficient way to share complex tasks, training assignments and schedules, and a better way for sailors throughout the ship to communicate onboard. After exploring a number of options, the Navy decided to implement a PDA program. At first, an initial 30 officers on board used the devices for their daily activities and uploaded and downloaded each day's data. The pilot program was a success and slated to expand to include the enlisted personnel on board as well. "With a limited number of desktop gateways to the ship's local network, we knew we'd need more interfaces to replicate and exchange data aboard the ship," said Mike Gray, deputy chief information officer of the Atlantic Fleet's Naval Surface Force. "The users would need more portals to the information stored on the network."

The Navy implemented a system that combined Aether's ScoutWare technology to help manage and transmit the data with 32 infrared wireless communications posts provided by Clarinet Systems of Milpitas, Calif., a developer of wireless technologies. The Navy then increased the number of Palm handhelds aboard the McFaul to 145 to accommodate almost half of the ship's crew. Not only was work facilitated by the new system, but also crew morale enjoyed a boost. Sailors enjoyed the personal benefit of being able to easily send and receive email back home by linking to and communicating through the central McFaul communications server. "This is what it's all about: putting technology into the hands of sailors to not only increase combat readiness, but to enhance their quality of service," said VADM Henry C. Giffin, III, Former Commander, Naval Surface Force, Atlantic Fleet U.S. Navy.



## SHIP BUILDING

Palm handhelds have also streamlined the Navy's shipbuilding process. The Navy's Program Executive Office for Theater Surface Combatants (PEOTSC), with the help of third-party developer TMA, Inc. of McLean, Virginia, used Palm handhelds to track newly constructed Arleigh Burke (DDG 51 Class) guided missile destroyers, replacing a paper-based system and simplifying ship inspections and workflow management. Inspection includes assessments of numerous ship systems, compartments, work completed, corrections made, and readiness for taking new ships to sea. Inspectors use Palm handhelds loaded with electronic forms that include drop-down menus. The electronic forms allow inspectors to tap on an item to cite a deficiency or to note that an item meets inspection requirements. Inspection records are shared via Hotsync, which enables inspectors and shipyard supervisors to receive data updates on new inspections and work completion status. The data exchanges also sync with the central database, enabling the handhelds to transcend from a data-collection tool to a workflow-management planner.

"Introducing the handhelds has improved the quality, timeliness and efficiency of collecting the complex shipbuilding data," said Commander Scott Spooner, production manager, U.S. Navy. "By automating this process, we now save days of clerical data entry per ship, and have also improved the consistency and accuracy of data collected, which allows faster turnaround of data."

## MEDICAL SERVICES

Another critical support function in any branch of the service is medical service. Physicians at Naval Medical Center Portsmouth use Palm handhelds to maintain patient files and access reference materials, pager numbers and notes from the care team. Now, doctors can easily beam or synchronize patients' complete medical histories and instructions to the overnight staff, giving them simple, mobile ac-

cess to everything they need to know about their patients, from allergies to recent medical procedures.

Naval Medical Center Portsmouth is the oldest continuously running hospital in the United States Navy, delivering state-of-the-art healthcare to sailors and their families since 1830. To continue its tradition of excellence, the medical center must provide physicians with the information they need to effectively care for patients.

Until recently, physicians at Naval Medical Center Portsmouth kept track of patients by recording medical information, patient histories and to-do lists on index cards. "When someone called for a phone consultation," says Dr. Brian N. Bowes, Staff Internist, "those chicken-scratched index cards often left us without a lot of information, and we had to go to the file room to fill in the gaps." In addition, preparing for the daily changeover to the overnight shift-when one doctor is responsible for as many as 40 patients-could be overwhelming. The physician on duty often had only a few hurried minutes to consult with the daytime care team and jot down notes.

Naval Medical Center Portsmouth needed to find a more effective way for physicians to communicate complex patient data and instructions and give both daytime and overnight physicians better access to information. "Adequate" worked for years," said Bowes, "but the idea was to make both the process and quality better."

The Center developed an application that runs on Palm handhelds and is synchronized with Windows NT servers. The application gives physicians an easy-to-reference format for maintaining patient files, saving time and reducing the chance of errors associated with handwritten notes. The Palm solution also gives physicians access to reference materials, medical algorithms, flow sheets, frequently used pager numbers and notes from the care team.

The handhelds streamline the process of preparing for the overnight shift. Now, doctors can easily beam or synchronize patients' complete med-



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is made of pixels*



ical histories and instructions to the overnight staff, giving them simple, mobile access to everything they need to know about their patients, from allergies to recent medical procedures.

Eventually, Naval Medical Center Portsmouth wants to develop a wireless network that will query a central database every night and synchronize the next day's patient list. "Ideally, doctors could come in to find a list of all the current medicines, lab values, allergies, tests and pending problems loaded on their Palm handheld," said Bowes.

The Palm solution gives Naval Medical Center Portsmouth physicians mobile access to comprehensive medical information. With this tool, physicians no longer rely on handwritten index cards for patient data, improving efficiency and reducing the possibility for error.

#### USES IN THE U.S. ARMY

The Navy isn't the only branch of the service embracing PDA technology. Whether you need to build a snow shelter, trap wild game, or recognize edible plants in the wild, the *Army Survival Manual* has long been hailed as a classic. Covering every climate and every situation, this book is the soldier's bible for living in the wild. This classic is now available for downloading on the Palm. For soldiers in the field and civilians who want to be prepared, it's a must and it's available at [www.military.com](http://www.military.com).

Palms seem to be the early favorite in the military based on their simplicity of use and reliability. One company that sees this as a developing trend is Warrior Solutions, Inc of Boulder Colorado. "Your average sergeant has got to keep up with something like 300 individual elements of data on every soldier under him," said Charles Stibrany, vice president and co-founder of the company. Stibrany served 24 years in the U.S. Army before retiring with the rank of Lt. Colonel in 1999.

Warrior Solution's breakthrough product is Platoon Warrior Personnel and Leader's Guides. The Platoon Leader's guides help military leaders track platoon logistics and monitor information on each soldier in their troop, including blood types, important dates, physical-training test scores, education, equipment training, weapons testing scores, even uniform sizes. The software includes a navigation system, checklists and memory aids for routine field operations and training scenarios. The handheld system enables leaders to free themselves of bulky reference notebooks that were once crucial to daily activities. In addition, the handhelds save leaders valuable time that was once wasted on paperwork. Today, platoon leaders can simply enter information into their Palms and then Hot-Sync to send updated information to their PCs.

"The Palm system is fantastic," said Staff Sergeant Jim Lewis, Law Enforcement Command, Fort Knox. "It is a powerful, portable database, packaged in a simple format. I have almost completely eliminated paperwork because I no longer have to flip through reference books and notebooks to obtain important information I need on my platoon."



#### FOOD SERVICES

Caesar once said that an army marches on its stomach. Around the world, the US Army feeds its soldiers in 350 dining facilities or field locations. Keeping track of inventories, menu planning and pricing, recipe conversion and accounting for soldiers' meal entitlements are all essential parts of the daily operation. At Fort Hood, twelve dining halls each serve three meals a day to as many as 400 soldiers at a time.

The Army, in conjunction with Columbia, MD-based developer Impact Innovations Government Group has created a prototype Windows NT-based, client/server application to replace their legacy mini-computer system, which has become obsolete and cost-prohibitive. FS2000 is a food management system tailored to meet the requirements of the military. One of FS2000's many functions is to capture the subsistence entitlement of soldiers, i.e., to what extent their meal is subsidized. The traditional method is to



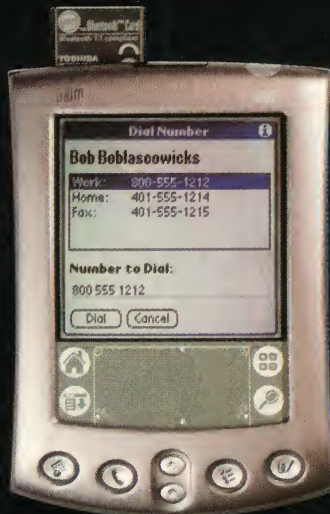


have soldiers write their social security number, rank, service, and entitlement on a clipboard upon entering a dining facility. If the soldier receives a cash subsistence entitlement, a cashier also collects for the price of the meal. This tedious method often kept hungry soldiers waiting in line. Moreover, cashiers counted cash receipts by hand and a data entry clerk spent approximately two hours entering this information into a SQL database. The dining facility manager would then use this data to produce a monthly report indicating how many meals were served and verifying if the soldiers entered the correct entitlement.

To eliminate the cumbersome clipboard process, Impact Innovations and the Army opted to evaluate Palm devices as an alternative to expensive point-of-sale systems. Now, cashiers using Palms with attached bar code scanners quickly swipe soldiers' ID cards bearing all the necessary information. The Palm also calculates how much money each diner owes for a meal, displays it, and stores the information with the other collected data. At the end of the day, the Palms are synchronized with a Windows NT server, which uploads the data into the SQL database. The server then generates a daily report showing any discrepancies in the amount of cash collected and if any soldiers used the wrong entitlement code.

"Using the new Palm-driven process, Fort Hood is eliminating hours of data entry and report generation," said Toby Ostrowski of the U.S. Army Center of Excellence, Subsistence (ACES). "The solution also allows managers to determine in real-time how many soldiers have been served and whether to prepare more food, thus making it possible to improve meal planning and reduce food waste."

The Army is considering an added feature that enables soldiers to use their ID cards using the Palm application to deduct the cost of their meals di-



rectly from their paychecks. This would eliminate the cash transaction process, increase traffic flow, and ultimately, increase customer satisfactions.

## LOOKING INTO THE FUTURE


In the novel *Starship Troopers*, Robert Heinlein envisioned soldiers of the future in suits that were complete defense systems replete with devastating weapons as well as access to sensor data and complete communication with fellow troopers on the ground as well as command posts in starships overhead. Current research projects like the Invisible Computing Initiative by the Defense Advanced Research Projects Agency (DARPA) aim at making this a reality.

A part of this effort is Project Aura. True to its ephemeral name, Project Aura seeks to redefine the very nature of computing itself. Researchers at Carnegie Mellon University have led this project to rethink human-computer interaction to remove distractions that get in the way of immediate problem-solving and information flow. A key concern for a future soldier relying on a high-tech information flow that is as critical, if not more so, than the flow of ammunition and supplies. Eventually researchers aim to create an "invisible halo" of continuous computing and information flow that continues no matter where the soldier is located.

The Project Aura system will design and evaluate a system that encompasses handheld computers, wearables, desktop and network computers within an information grid. Just as modern fighter pilots can observe displays projected in front of them so they don't have to take their attention from the battle to the cockpit gauges, the same type of display is seen for soldiers on the ground. "Nomadic Data Access" is also a part of the plan. This is the concept of "Internet Resync" for palmtop computers. Rather than tying a PDA to a specific machine as is done today, the project's goal is to resync from anywhere using a program called Coda. Demonstrations using an early version of the Compaq IPAQ were successful with varying modes of access such as Bluetooth, WaveLAN or infrared. Researchers plan to use this capability to demonstrate how a user's information "aura" can be extended with its "shadow" as the user moves.

Now that the soldier of the future is taken care of, what's happening at headquarters? Another one of DARPA's pet projects is called the "Command Center of the Future." Not too far removed from the image of the *Starship Troopers* generals in the sky directing a battle from orbit, this project focuses on using handheld computers for staff to quickly analyze battle data without disrupting the big picture projected on the wall in front of the commanders. One of the many facets of this project spearheaded by Carnegie Mellon is called Pebbles, short for PDAs for Entry of Both Bytes and Locations from External Sources.

Pebbles looks at using handheld computers in a shared space. Imagine you're in the "Command Post of the Future" looking at a large satellite projection on screen. There may be maps, pictures and schedules of the current situation. Let's say you're interested in an operation involving several Army platoons that are clearing caves. You could focus your PDA with a special unobtrusive cursor on that part of the main display that you're interested in. Your PDA would then offer you a menu attuned to your particular needs, you select your item of interest and check out the situation so that you can make recommendations and report status to the commander. At the same time in the same room, a Navy officer could be using his PDA to beam at a carrier group at sea to get their status in order to make recommendations. All the while, the commanders are not being distracted from the "big picture."

From the current handheld applications in the service to futuristic systems on the drawing board, handheld computers will play an ever-increasing role in our nation's defense. In future wars, victory will literally be in the palm of our hand. 

*Ted Vodde, a frequent contributor to Pen Computing Magazine, is a freelance author and Adjunct Professor of Journalism at the University of Montevallo living in Alabaster, Alabama*







The powerful Pentium 4-based Panasonic Toughbook CF-72 is equally at home on a mahogany desk as it is in a lumberyard.

## IN BRIEF

The Toughbook CF-72 does the seemingly impossible: it provides state-of-the-art notebook power in a sleek yet very sturdy package. With its spill-resistant keyboard, tough magnesium case for both the system unit and the LCD display, and generally rugged construction, the CF-72 can handle abuse that would destroy ordinary consumer market notebooks. Yet, unlike many rugged devices, it is technologically up-to-date. Its 1.6GHz Pentium 4 has plenty of power to drive Windows 2000 or Windows XP (it comes with both; you pick). Its multimedia pocket can accommodate everything from a floppy drive to a second battery, a second disk, or a combo DVD multi drive. There are numerous internal wireless options, and we love the cool magnesium handle!

## DURABILITY

Not as thick and tanklike as the CF-28, but tougher by a mile than standard notebook computers thanks to its strong magnesium case.

## COMPETITION

Panasonic's own Toughbook 28 or 48, Amrel Rocky, Itronix' GoBooks, or the heavier Getac notebooks also sold by Dolch.

## CONTACT

Panasonic Computer Solutions  
www.panasonic.com/toughbook  
USA: 800-662-3537

# Panasonic Toughbook CF-72

WHEN TOTAL COST OF OWNERSHIP MATTERS

by C. H. Blickenstorfer

If you plan on equipping your team with new notebook computers and can't make up your mind which one of the popular brands to pick, consider the following before you make a decision.

A 2001 Technology Business Research, Inc. survey over over 400 IT managers, front line managers, and notebook users revealed that the damage rate of notebooks is higher than ever. The top three causes of notebook damage are drops, liquid spills, and objects falling on notebooks. The majority of damage involved the screen, case, keyboard, and hard drive. The average total cost per notebook damage incident was US\$2,900. Less than 30% of that is the actual cost of repair parts and labor. The rest is loss of productivity, the costs associated with recreating data, reloading backups, work delays, and loss of critical data.

Statistics and surveys, of course, can be used to make just about any point, but in this case the findings definitely point out

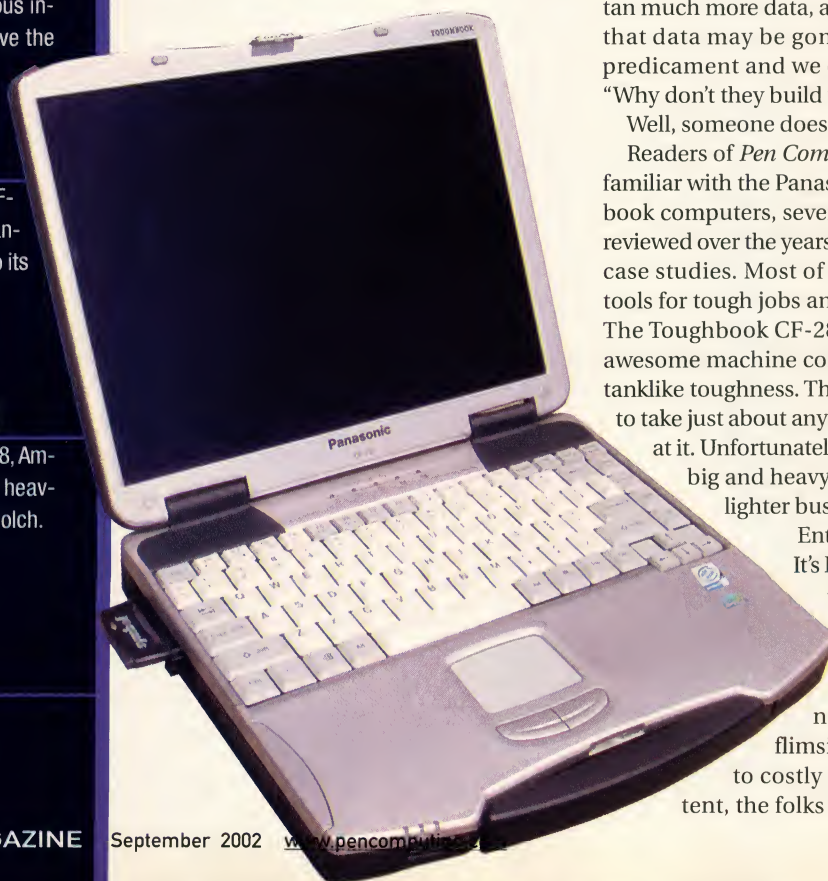
one of the darker secrets of notebook computers: most are not built to last. Many notebooks find their ways into our offices and labs for review and we are always dazzled by all the new features and whistles and bells, by sleek new designs, gorgeous finishes, and the latest add-ons and gadgets. Many of those products look great on a desk, but after a couple of days invariably someone will say, "That latch looks flimsy. Do you think it'll last?" or "Great LCD, but look how easily it twists," or "I'd love to take that thing on my trip, but I'm afraid I'll scratch it." And it's not just us. No one wants to risk doing damage to their computer. Computers are part of modern life. We need them for staying in touch when on the road, making an important presentation, writing a report. The computer is essential. It must not break.

And yet it often does. As LCD displays are growing larger they're easier to twist and break, and they have forced notebooks to become larger as well. Larger disks can contain much more data, and when they break, that data may be gone. It's really quite a predicament and we often ask ourselves: "Why don't they build these things to last?"

Well, someone does.

Readers of *Pen Computing Magazine* are familiar with the Panasonic's line of Toughbook computers, several of which we have reviewed over the years or mentioned in our case studies. Most of those machines are tools for tough jobs and they look the part. The Toughbook CF-28, for example, is an awesome machine combining power with tanklike toughness. That's because it's built to take just about any abuse you can throw at it. Unfortunately, that machine is too big and heavy to replace a sleeker, lighter business notebook.

Enter the Toughbook 72. It's Panasonic's answer to those who need business-class performance, a business-class form factor, but none of that class's flimsiness and proneness to costly damage. To that extent, the folks at Panasonic built a





computer that's unmistakably a Toughbook both in look and toughness, but that also provides almost all of the amenities business users expect in a modern notebook.

How did Panasonic go about the task?

By using the same magnesium alloy LCD case and chassis used in all the industrial-strength Toughbooks. Magnesium is just a bit heavier than plastic, but many times tougher. A spill-resistant keyboard shrugs off a softdrink or cup of coffee just as easily as the industrial Toughbooks shrug off driving rain. By shock-mounting the precious hard drive with the same patented mechanisms and painstakingly researched materials as are used in the industrial models. And by integrating wireless into the basic design, eliminating electro-magnetic interference, supporting all major networks, and offering the kind of antenna that's optimized for a wireless technology. Because wireless performance means more than just sticking a card into a slot.

On the other hand, the 72 offers industry-standard performance and features. Ours came with a Mobile Intel Pentium 4 running at 1.6 GHz. It had a 30GB hard disk, a 13.3-inch XGA display with a touch screen and anti-reflective coating for easier reading outside. There is audio-in and audio-out, integrated stereo speakers, an integrated 56k modem, a RJ-45 jack for 10/100 Ethernet access, two USB ports, full size serial and parallel ports, external video, a PS/2 port for an external keyboard or mouse, IR, and two PC Card Type II slots. Standard memory is 256MB SDRAM, expandable to 768MB via a single expansion slot accessible through the bottom of the computer. The 72 has a media bay on its left side that can be populated with a variety of drive option. A standard 72 comes with a 8X DVD-ROM drive that can be replaced with a 1.44MB floppy drive that also comes with the package. Optionally available drives include CD-RW, DVD-ROM/CD-RW and a multi function drive that combines a variety of CD and DVD read and write standards. That's no problem for Panasonic. They make their own optical drives and you can be certain they all work well the Toughbooks. The bay also accepts a second hard drive. Power comes from a 3.6Ah Lithium-Ion rechargeable pack that lasts up to about 2.5 hours. A second battery can be placed into the multimedia bay via an adapter.

All of that fits into a package that measures 10.7 x 11.7 inches, is 1.75 inches thick, and weighs 6.4 pounds. For comparison's sake, a Dell Latitude C610 has a similar footprint (9.9 x 12.5 inches), is a bit thinner at 1.4 inches, and generally weighs somewhere in the five pound range. A Compaq/HP Evo N600 measures 12.1 x 9.8 inches, is a bit thinner yet, and weighs around five pounds.

From those figures you can tell that the extra ruggedness of the Toughbook means that it will be a bit thicker and perhaps a pound heavier than those standard business notebooks. Also, they have 14.1-inch displays whereas the sturdy magnesium frame of the 72 accommodates a 13.3-inch screen.


While the 72 is approximates the dimensions, size, weight, and performances of a standard business notebook, it definitely has a look and feel all of its own. The matte-silver sheen of the magnesium case, the ingeniously designed handle that retracts to become part of the overall design, the general sense of quality and sturdiness, and the ease with which Panasonic engineered industry-standard performance into this hardened shell combine to make the 72 a notebook like no other. Just as the name "ThinkPad" means something special because of its history, quality, and cachet, the term "Toughbook" seems destined to gain a dedicated following of its own. A following of users who want a computer they don't need to baby, and of IT managers who are sick of paying through the nose for notebooks that become incapacitated just because they tipped over or someone spilled a bit of coffee on the keyboard.

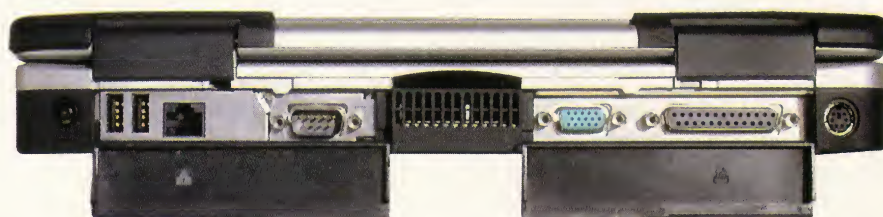
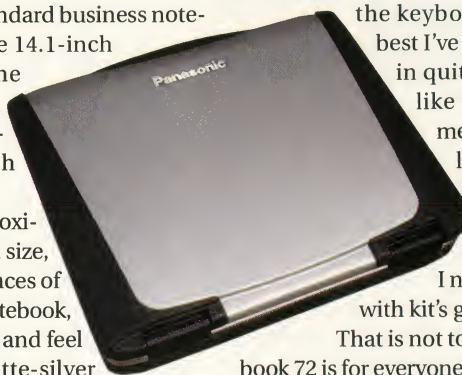
Living with the Toughbook 72 for a few weeks was a pleasure. Its 1.6 Ghz Pentium 4 provided speedy performance. The installed

Windows XP was solid as a rock. It had all the ports and expansion I needed, I loved having both a touch screen and a touch pad, the keyboard was one of the best I've used on a notebook in quite some time, and I like the handle that let me carry around the 72 like a small attache case. What I liked even better was that I never felt like I needed to treat the 72 with kid's gloves.

That is not to say that the Toughbook 72 is for everyone. An extra pound can mean a lot if you have to carry a machine all day long. And those who must have the full gamut of the latest do-dads, switches, and blinking lights may miss them on the no-nonsense purposeful design of the 72. Finally, despite the excellent heat-dissipating qualities of magnesium, the 72 tends to get quite hot. Some may also object to the 72's retail price of about US\$4,000 which is quite a bit higher than that of a comparable non-rugged standard business notebook.

What it boils down to is this: with the Panasonic Toughbook 72, IT managers now have an alternative to the standard notebook, an alternative that offers all the performance of the standard fare, but quite possibly a lot fewer of the headaches and costs of longer term ownership.

It's a proposition that any smart executive should consider. 



## SPECIFICATIONS

|                       |  |
|-----------------------|--|
| <b>PROCESSOR</b>      | 1.6GHZ MOBILE INTEL PENTIUM 4, 512KB L2 CACHE                |
| <b>OS</b>             | MICROSOFT WINDOWS 2000 OR WINDOWS XP                         |
| <b>COMMS</b>          | 10/100BASE-T, OPTIONAL INTEGRATED WIRELESS                   |
| <b>WIRELESS</b>       | OPTIONAL INTEGRATED CDPD/CINGULAR/MOTIENT/GPRS/GPS/CDMA      |
| <b>MEMORY</b>         | 256MB SDRAM EXPANDABLE TO 768MB (VIA PC-2100 MEMORY)         |
| <b>STORAGE/DRIVES</b> | SHOCK MOUNTED 30GB HARD DISK, DVD                            |
| <b>SLOTS</b>          | 2 PC CARD TYPE II OR 1 TYPE III                              |
| <b>DISPLAY</b>        | 13.3" XGA TFT WITH ANTI-REFLECTIVE COATING                   |
| <b>KEYBOARD/PEN</b>   | FULL-SIZE 86-KEYS, TOUCHSCREEN OPTIONAL                      |
| <b>DIMENSIONS</b>     | 11.7" X 10.5" X 1.8"   |
| <b>HOUSING</b>        | MAGNESIUM ALLOY  |
| <b>WEIGHT</b>         | 6.4 POUNDS (INCL. BATTERY)                                   |
| <b>POWER</b>          | 3.6AH (UP TO 2.5 HOURS)                                      |
| <b>INTERFACE</b>      | S/P, 2 USB, AUDIO, IR, RJ-11, RJ-45, REPLICATOR, PS/2        |
| <b>OPTIONS</b>        | PORT REPLICATOR, BATTERIES, WIRELESS, BATTERY, CASES, DRIVES |
| <b>PRICE</b>          | US\$3,999 (\$4,322 WITH DVD/CDRW); ADD \$200 FOR TOUCHSCREEN |





# High time to kick in the hard drive

by Shawn Barnett

**C**onvergence is happening whether I like it or not. I'm still a greater fan of modularity, with an adaptable computer at the core to which you add the peripherals you need. It's worked for the PC industry. Admittedly, that's tougher to do with something as small as a PDA. They're generally stripped down to the bare essentials, and adding things like cables, wires, and snap-ons only make them cumbersome. Ultimately, if it's important enough, you blend it into the next version.

As a result, many convergence advocates seem to want the PDA to merge with a phone. It does give the PDA broader communication skills, and it also gives the phone the data it needs to dial a call. But I'm not sure that's for everyone, nor is it an ideal solution. Some of us like a simple phone that just places a call when we need to do some voice communication. I have a cell phone with buttons strategically placed to make sure I have quick access to the provider's Internet services, and I often get lost just trying to place a simple call. And I'm a gadget guy by trade.

Voice communication is an essential element of human interaction. Go ahead and integrate a PDA, but if any component of that PDA gets in the way of the core purpose for the phone, I can guarantee you the phone will not be a long-term success in the marketplace. And the market actually willing to spend *extra* on a phone with features most don't even know they need is small indeed.

Don't get me wrong. I think there are many of us who will buy and use these devices. There are bugs and problems to be worked out, but products like the Treo should do well enough. After all, there are many Palm OS fans out there who will want to give it a try. My point is that merging a cell phone and a PDA is not all there is to the future of mobile computing.

## It's about data

In fact, the Holy Grail of Wireless Data is actually a red herring. It's not as much about being able to pull data out of the air when you need it as it is about having the data with you when you need it. And not only the data, but the tools. I submit that when it's all over, people will only use these vaunted wireless tools some of the time. To check the news, the scores, maybe buy something. But we won't be accessing the data from our home computers wirelessly. Hackers and other scum-sucking fools will ensure that. And no, Larry, we won't be pulling down a silly word processor program wirelessly every time we need to write a

letter to someone. The Network Computer not only never really lived, it will never go mobile. Tragically, wireless mobile devices as currently envisioned are similar to this ill-conceived network dependent model partially because of their insufficient internal storage. In the mobile world it's mainly done because it's necessary. At least it was.

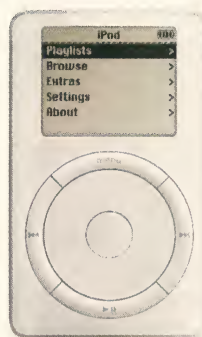
## END PDA ASCETICISM

The two products at right are showing the way. The Apple iPod and the TIQIT eightythree come into a world of PDAs using volatile RAM and expensive memory cards to extend battery life and reduce size at the expense of capacity.

The iPod, a mobile music player that can hold thousands of MP3 songs on a single 5GB hard drive, took the market by storm with its capacity and innovative design. Others had already done the same, but not with such class, nor with this diminutive size (achieved by using Toshiba's 1.8 inch hard drive). Applying the Palm's HotSync concept to music files, the little MP3 player both charges and syncs its songs at high speed via Firewire. It runs for 10 hours, yet is smaller than a Palm Pilot. And unlike a Palm, if the battery dies, all the data doesn't disappear; you don't need to reload lost songs and data from a svelte SD card, nor do you HotSync again. Just charge it back up and all the original data is there. Because like a PC, there's a hard drive in there.

When we compare the iPod to the current crop of MP3-playing PDAs, the PDAs are more than a step behind with their 128MB card capacities and slow upload speeds. Spending time selecting thirty songs to listen to ad nauseum until you bother to upload more later is like loading your CD holder with fifty CDs, only you get a lot fewer songs. The iPod eliminates this tedium, ensuring you have all the songs you love with you when you want to listen to or share them, without external cards, disks, or tapes. This can be done with all kinds of data, including contact information.

To the right of the iPod is the TIQIT eightythree, a Pentium-class computer in a near-Palm-size case. I've only held one for a short time, but it's clear these guys saw the next wave coming and grabbed their surfboards for the ride. No, it's not a perfect concept. Part of the reason we need the Palm OS is that it is designed to interface with humans via a small screen. Windows XP



was designed for humans using a desk, monitor, chair, keyboard, and mouse. The screen above is beautiful, but even with my excellent near vision, I would have eyestrain trying to read text this way. Notwithstanding, this is a promising product concept that could take the PDA world by surprise. I can already hear the pundits: "*It's the Post PDA Era!*"

## We have DRIVES now

They'd have a point. But they'd have missed the main point, dizzy from chasing their latest tale. In the broad sense, a Personal Computer is as much a Personal Digital Assistant as a Personal Digital Assistant is a Personal Computer. They both handle data in our digital world. And thanks to new technology, the day is gone where a Palm OS device can't have a hard drive. Miniaturization has caught up and is enabling the components of the PC, formerly components of the mainframe, to reach down into the realm of the pocketable.

PDA makers of late have been focusing on giving us wireless access to public data via the Web. While I think that's important, I think they just might need to be reminded that the lion's share of PDA owners really want a PDA to carry their *personal* data (note the root word in PC and PDA). Phone numbers fit perfectly on any old Palm, but MP3, photos, videos, and even corporate documents continually require more storage.

It's hybrid PDA time. Such a device needs the Palm OS for the small screen, and an ATA interface for connecting via Firewire or USB 2.0. It eventually might evolve from a storage and transport device into a full PC, with a port for keyboard and monitor. It won't mark the end of an era, just another step in the continuing march to make personal computing more personal. ☞



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# Sony CLIE T665C

The pinnacle of traditional PDA design

Sony has released an unprecedented eight new CLIEs in a year, more than any handheld maker in history. Their constant stream of innovations have transformed the simple Palm Pilot into a multimedia monster rivaling Pocket PCs with vastly greater memory and speed resources on tap. Palm has the faithful waiting patiently for the new Palm OS 5 machines, but Sony isn't interested in sitting around and waiting. They've single-handedly invigorated the slightly stale Palm-powered arena to such a great extent that it wouldn't surprise me to see Sony buy Palm Computing.

By any measure, Sony is seriously interested in commanding this market, and their suddenly double-digit marketshare proves their approach is working. The breakneck pace of new model introduction is fun to watch and write about, but can leave users feeling slightly wary about committing to a device that will probably be obsolete in six weeks.

## Double-time

In my own case, I wanted to buy a T615c when the price dropped to under US\$200. I bought it, then returned it a week later when I heard about its replacement, the T665C. This new machine has a zippy 66MHz processor that is twice as fast as its predecessor, built-in music playing software and headphones. I like the form-factor of the metal-bodied T series CLIEs and don't

require the ability to play music on my handheld, relying instead on my beloved Apple iPod for that. The T615c would have served me perfectly, yet I decided against it.

The CLIE T665C is a lovely machine in every way. It does everything we've all come to expect from a Palm device quickly and colorfully. The new 66MHz processor really makes a difference when you're riffling through a stack of photos. As in most things in life, having extra power at your command is always beneficial. The T665C reminds me of nothing less than a silver

Lexus IS300 sport sedan. Every detail seems sculpted rather than manufactured. Fit and finish are superb, with knife-edge cutlines, a solid feel to every control, and a reassuring balance that your eye tells you to expect and your hand soon confirms.

Physically, this machine is the pinnacle of the traditional personal digital assistant, but Sony did not take it all the way and bring it into the 21st century. There are no wireless options, not even the Sony Bluetooth Memory Stick is available. There are no GPRS sleds, no WiFi cards, no cellphone options...nothing. These days, I find it hard to justify paying four or five hundred dollars on a machine that can't get my email from the air or let me phone home.

## Software delight

Sony always includes with their CLIEs a collection of useful Windows software and several fine Palm apps, and the T665C is no exception. Apple users need to purchase The Missing Sync from MarkSpace ([www.markspace.com](http://www.markspace.com)) to connect and sync information with their Macs. The PictureGear Lite/PG Pocket combo make it easy to album and view your digital photos on both the big screen and the little one. CLIE Paint is fun and well-featured, and the World Alarm Clock is the pretti-

est application of its type I've seen. Sony bundles the standard edition of Dataviz' Documents to Go for viewing and editing Microsoft Word and Excel documents.

## Birds and Beethoven

Sony's wonderful Sound Utility makes all other Palm devices sound puny and feeble. Audio-Player is well designed and MP3 sound quality is as good or better than any other PDA I've heard, offering true FM synthesis and 8-bit depth. The supplied earbud headphones are acceptable, but the handy remote control is curiously missing from this model, as are the excellent earclip-type 'phones that ship with the NR70V. The vibrate alarm feature is a must-have option for theatres and other places where twittering birds and Beethoven riffs are unwelcome.

Compared to the latest color CLIE, the pudgy and likable SJ30, the T665C seems at first glance to be a bit big. Put one in each trouser pocket however, and you'll find the T665C to be a more pleasant traveling companion; the slimness really counts here. Put them both on a postal scale and you'll see the T665C weighs 2/10s of an ounce less than the plastic-bodied SJ30. The two machines share the same bright, 320x320 pixel daylight-readable display and control area, and they both use the same connector on the base for power and data communications. The similarities end there, however, with the T665 clearly taking home the beauty prize as well as the higher SAT score. If it had a wireless option, it would be perfect. For such a machine, I'd lay my own cash down without hesitation.

—David MacNeill





# Handspring Treo 300

Preview: new CDMA model just for Sprint PCS Vision

**A**nounced just days after the launch of Sprint's 3G PCS Vision service, Handspring's Treo 300 features a slightly modified shape, a more solid feel, and is able to take advantage of the Nation's first 3G network. Like the Treo 270, it has a 12-bit screen (4,096 colors), a 33MHz processor, 16MB RAM, and a QWERTY keyboard.

Users of the Treo 300 can download PCS Business Connection Personal Edition software, which allows one-touch access to corporate email, calendar, and contacts while mobile. This service is included with the US\$84.99 per month calling plan, and is alternately available for US\$5.00 per month for lower-priced plans. Customers are billed based on the amount of megabytes sent and received.

Data speeds on the new network are said to be between 50 and 70Kbps.

As offered on GSM Treo models, the Treo 300 has an integrated Palm OS PDA that is compatible with thousands of Palm OS programs. In addition, there's a Web browser, Short Message Service, and the option of using Treo Mail, an email delivery service. Treo's most distinguishing feature is its built-in Qwerty keyboard. It's amazing how easy it is to look up a contact or phone number with Handspring's implementation. Just enter a few letters of the person's name and you've usually got your contact onscreen and ready to dial. Phone numbers are also easy to enter with the embedded keypad.

This latest Treo is available Nationwide at Sprint Stores, third

party outlets, and online at <http://www.sprintpcs.com>, as well as at <http://www.handspring.com>. We're looking for-

ward to getting our hands on one for review. It will be interesting to see whether it's faster at data tasks. *—Shawn Barnett*



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# Mobility





# Sony SJ20 & SJ30

Sony trims fat from CLIE line with new models

The face of mobile computing is shrinking. Though they're not the first of the Palm OS PDAs to get smaller than the venerable Palm V, the Sony CLIE SJ20 and SJ30 mark

with a surreal green glowing backlight. Unfortunately, it was nearly impossible to read in anything but direct sunlight because of the low contrast and dim backlight.

The SJ20 uses a different approach. While it's a good deal thicker than the T415, it's at least a half inch shorter. And this time they took advantage of that extra thickness and gave the screen not only a decent backlight, but a fabulously bright, almost paper white backlight. No, they didn't light up the pixels like Palm and Handspring have done to my chagrin—instead Sony lit the background, just as they did with the S300 series. The effect is reminiscent of a black and

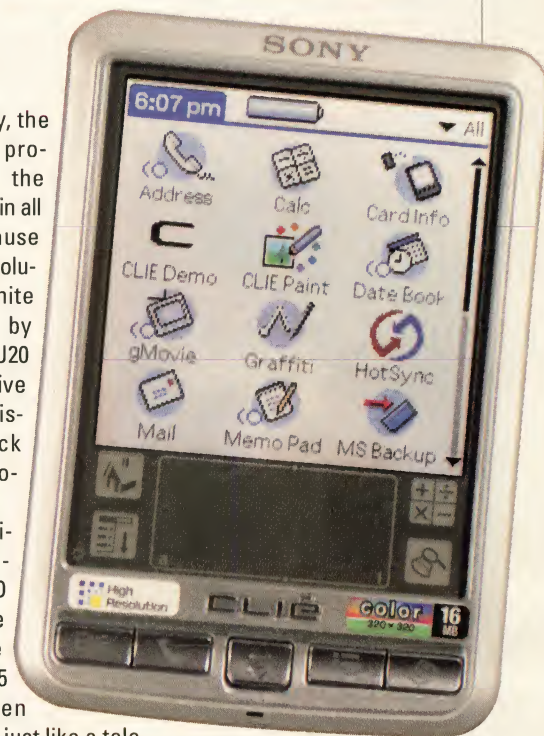
white television screen, or even a newspaper. The pixels aren't perfectly black, more of a very dark grey, but the experience is excellent. Transition to daylight is almost seamless; even the tone of the background remains the same, indoors or out.

One feature that doesn't appear improved from the T415 is the relatively slow refresh. It's unclear why, because while icons and photos in Picture Gear Pocket draw to the

screen slowly, the Photostand program drops the same pictures in all at once. Because of the high resolution and white background, by the way, the SJ20 is an impressive platform for displaying black and white photographs.

Unlike traditional monochrome LED screens, the screens of the SJ20 and T415 are dark when the unit is off, just like a television set. A matching, and handsome dark mask beneath the digitizer surrounds the screen and continues down to the Graffiti area. The plastic bezel around the face wastes no space, neither top, bottom, nor sides. I'm still waiting for a near edge-to-edge screen, but at least the extraneous top and bottom are eliminated for an overall small package.

*Though the T415 was taller, slimmer, and more stylish than the nonsense SJ20, it is the screen that will not be missed. The SJ20's screen is bright like a B&W TV; using the T415 was more akin to looking at a PDA through a welding shield.*

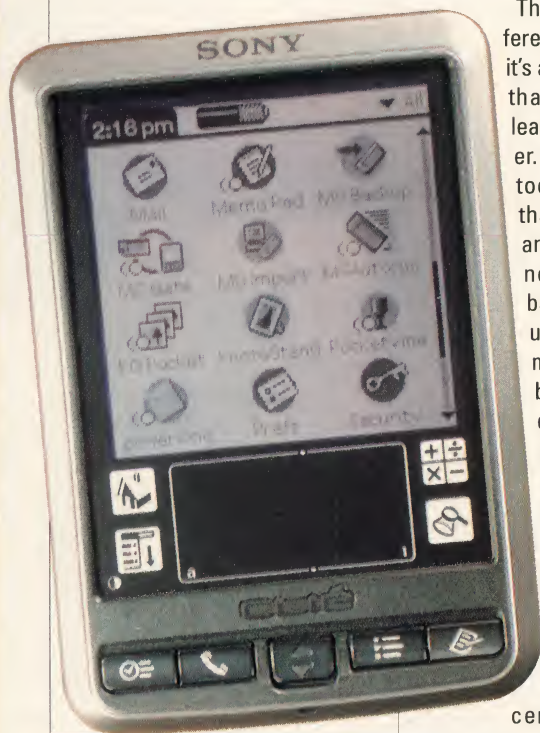


## SJ30

The color screen on the SJ30 appears to be the same as on the current T665C. It is bigger than the monochrome screen on the SJ20, quite a visible difference. The screen draws faster than the SJ20's as well. It is a backlit, reflective TFT design, with 320 x 320 resolution, displaying 64K colors.

Photos display very nicely on the SJ30. Except for the display, everything on the SJ30 is identical to the SJ20, save for the flip cover which is gray on the color model and dark gray on the B&W.

Across the bottom face are the usual four buttons, nicely rocker-shaped. The rocker toggle itself is more traditional than on T-series CLIEs, and it works better. Right below the rocker is the



the beginning of a trend (the SL10 actually began this move in the Sony camp). Photographs of the new units actually look a little odd because we're so used to seeing a taller profile. They look somewhat squat, even pudgy without a frame of reference.

## SJ20

For comparison, I've placed the SJ20 next to its predecessor, the Sony T415 (see image at right). The SJ20 has a lot in common with the T415. The T415 broke new ground in design, with a slim, one-piece housing that evoked a Star Trek PADD. It was slim because it used a unique screen design, a high-resolution (320 x 320) monochrome LCD





charge indicator LED. On the left are the Jog Dial and "back" button. The bottom has the standard connector used on the T and NR series CLIEs, a welcome trend that I hope continues (the SL10, it should be noted, has no cradle connector, only a USB connector on the side).

The top of both units features a lanyard loop, the IrDA window, Memory Stick slot with a dust door, and the power button. I'm not excited about the power button's position on top of the unit, but it is well protected from accidental activation by the included flip cover.

The flip cover shows that Sony has learned some lessons from past models. The flexible hinge is reinforced with plastic inserts that help maintain the cover's alignment with the front face. It also helps the cover reach out over the somewhat thick top of the unit and yet still

least snicks in place more positively than the stylus of the NR70V.

16MB of RAM, a 33MHz Dragonball VZ processor, and USB connectivity round out both offerings. No cradle is included, instead a HotSync cable and charging cable are supplied, with a small plastic snap and connector to hold them together and combine them into a single HotSync and charging solution. It's a little odd to have to do so much assembly, and the assembly itself is a little confusing at first. Both SJ models are compatible with T-series cradles.

Applications are standard Sony fare, with the enhanced Address Book, gMovie, PictureGear Pocket, CLIE Paint, plus demo versions of PocketVineyard and Pocket Gourmet.

I don't really miss the MP3 player; I tend to think that HDD-based products like the Apple iPOD have that market sewn up

with their greater storage capacity. I'm waiting for Sony to come out with something like that: call it the

PalmMan and best both Apple and Palm with one device.

Meanwhile, the CLIE SJ20 and SJ30 are tight, low-profile PDAs with utilitarian style. They're a little on the thick side, and also somewhat weighty at 5.3 ounces for the SJ20 and 5.7 ounces for the SJ30. Nonetheless, I appreciate their solid feel, excellent screens, and diminutive profile. These stout little handhelds are packed with most of the high-end features one needs in a PDA. Students and first time purchasers will be pleased both with their great screens and relatively US\$199 and US\$299 price tags.

—Shawn Barnett

## pocketquicken

Pocket Quicken 2.0 makes it simple to keep your financial information complete, accurate and organized wherever you go. Transferring data is quick and hassle free—just press the HotSync button.

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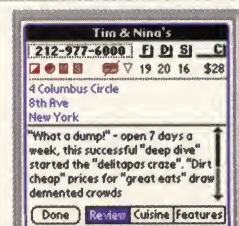
—PalmPower Magazine



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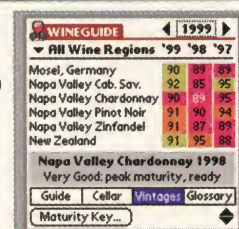
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—BusinessWeek Magazine



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# Magellan m500 GPS Companion

Backward compatible follow-on to the Palm V model

Last year I gave several Palm-compatible GPS units a look, with an emphasis on integrated sled or module designs. There were about four available. Unfortunately, I was only able to get one to work reliably, the Magellan GPS Companion for Palm V. Other brands either failed completely, or couldn't hear enough satellites to get a fix. Ultimately, I ended up comparing the GPS Companion to the Magellan Map 330, a dedicated GPS. Both had something to offer: the Map 330 had a base map for the entire United States, handy when you went off your pre-planned course; and the GPS Companion for Palm V had the dual advantage of low cost and also being a PDA with all your other important data, great for travelling businessmen and those who only needed a GPS infrequently.

Now it's over a year later, and the Palm V can no longer be obtained commercially. The m515 is established as the hot Palm device, and Magellan has shipped the GPS Companion for the m500. Again, I've obtained a few GPS solutions, and again, only the GPS companion seems to work.

On a recent 500 mile trip I de-

cided to put it through its paces. It performed well, offering a few more features than the old Palm V version. Foremost among them is the ability to load directions and get alerts to the next turn, plus the addition of color to the interface. I still like the old map program, so I loaded both to compare them. Because the m515 has 16MB RAM, it was easy to load sufficient maps for both, to completely cover the area I travel between Lake Tahoe and San Francisco.

With the old version, a slightly modified version of Quo Vadis software, I had to load maps by county. This required knowing what counties I was going to pass through on a given journey. This is not common knowledge among most of us; we may know the basic counties in the area, but they're usually drawn in such a way that we're often surprised to find that we've crossed into—and back out of—several counties on any drive over an hour long. Only program the few that you know, and you'll find that the crosshairs is floating alone on a blank screen after awhile. I eventually searched for and downloaded a map of California counties which helped me se-

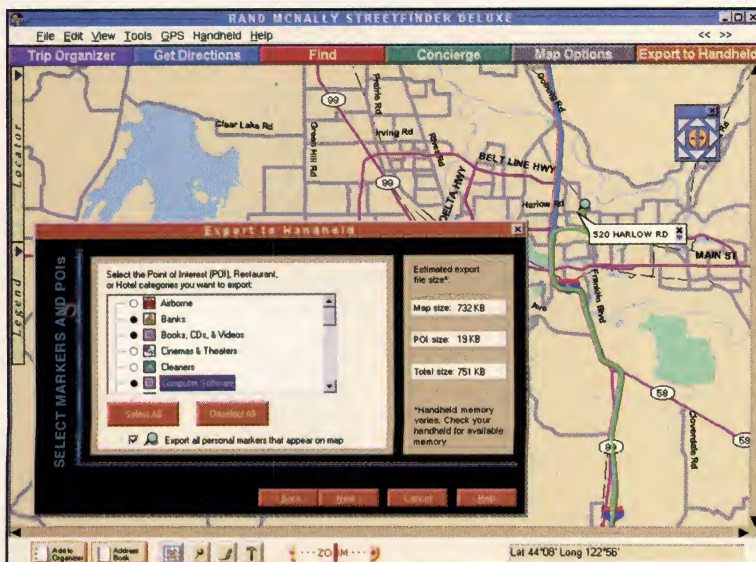
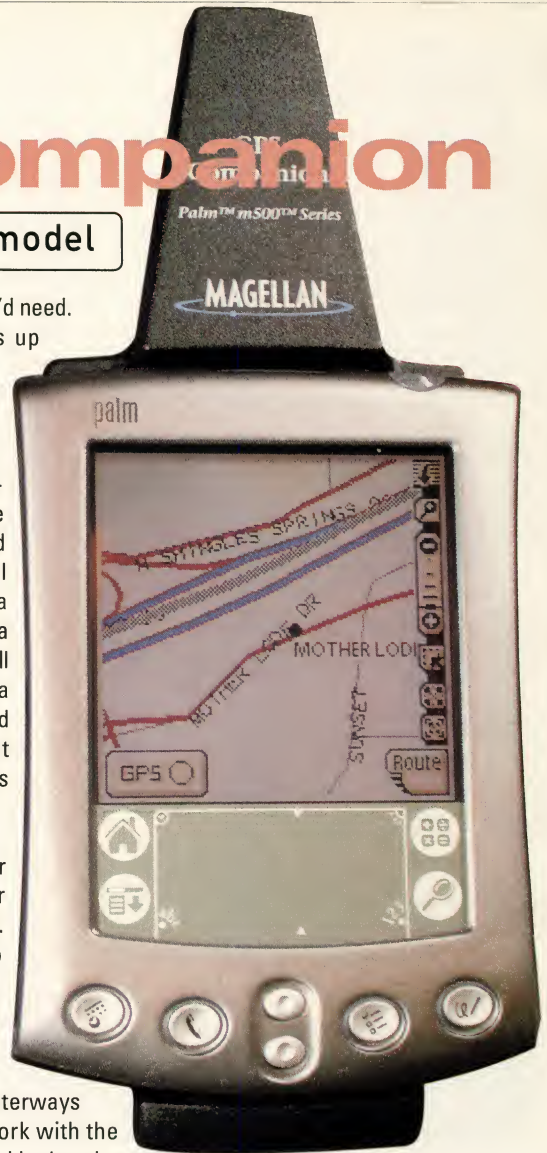
lect the ones I'd need.

This points up the one drawback to most PDA-based GPS systems: memory limitations require that you load only small maps from a larger PC. On a long trip, you'll need to bring a PC just to load maps. That news likely has meticulous planner-types rubbing their palms together in anticipation. What I'd like to see is a simple base-map of the US, with highways, cities, and waterways that would work with the GPS. I thought I had such a solution with the Rand McNally Road Atlas MultiMedia Card, but it doesn't work with the Magellan setup I have here. It's supposed to work with GPS units, and I'm told it does with Delorme's Earthmate GPS, but that doesn't meet my criteria of a sled-mounted GPS.

The good news is that the new Magellan GPS Companion comes bundled with Rand McNally's Street Finder Deluxe software. Now you no longer need to know the county, just find the area you'll be visiting on the PC-based program, resize the window to fit the shape and size of the map you want to send to the Palm, and hit the "Export to Handheld" button on the upper right of

the screen. With this method you can select and create several maps for upload. Were I to need the entire state of California, or even several states, I'd simply get a large SD card and load them all up, swapping them back and forth as necessary with a program like FileZ or FilePoint. Though the StreetFinder application will recognize and load them from the SD card, the maps I'm using are of such size that it's deadly slow. Here again is why I'd like to see someone cross an iPod with a Palm OS device: If I could load the entire StreetFinder database (around 2GB) onto such a PDA's HDD, that would be one cool GPS. Meanwhile, a couple of 64MB SD or MMC cards would handle the major states I visit without too much difficulty, so long as I plan ahead.

The other benefit offered by StreetFinder deluxe is the ability to upload Points of Interest (POI).



The bundled StreetFinder Deluxe offers to upload multiple points of interest for later retrieval on the Palm. Turn-by-turn directions can also be uploaded, but cannot be generated on the handheld.



Categories like Banks, FedEx offices, Hospitals, Nightlife, Hotels, and Restaurants. One obvious category missing is gas stations; I'm sure there are many travelers who would like to be able to find not only their favorite brands, but see where all the stations offering diesel fuel are located. Still, finding a bank, or better yet, computer supplies, can be quite beneficial when in a strange place. The POI database gives you basic address information, plus a phone number. Unfortunately, driving directions from your current position cannot be generated on the Palm. All such directions must be created in the PC and uploaded to the Palm. Again, pre-planners will be thrilled; those of us who refuse to plan ahead will be frustrated. However, any GPS will let you know when you're approaching the street or exit you want.

As you drive along, by default the GPS zooms in and out depending on your speed. When you're ripping along on the freeway, it zooms out to tell you what's ahead, and when you slow down to that exit, it zooms in and starts displaying surface street names. In use it's a great experience. You can turn the zoom off, however, and customize the colors to your liking, using themes or individual modifications depending on the map element. I find the default works well.

If you decide to upload a "Trip" you've created on the PC, you will get complete directions, with warnings that a turn is coming up, as well as cautions that you're off track, and a countdown for how many miles you have left to go. I've found that this feature is better used for short trips. Long trips are typically loaded as "barbell" maps, with a large area at both ends and just slim off-ramp coverage that follows the highway in-between. This is fine, but on long trips, you're going to want to load a larger area map as well so you can explore. A recent trip to Eugene, Oregon left me without the benefits of the larger map because I didn't have a lot of time to pay attention to how big that end of the "barbell" would be. It turns out it didn't cov-

er more than a mile around my hotel destination.

Another oddity was the gray trail that the program lay across my path. I think it's a good idea, and it impressively follows on-ramps and off-ramps religiously—that is until you get to the middle of your 500 mile trip. I found that the route was drawn about a half mile off to the left of Interstate 5 most of the way. And the program, instead of telling me how many miles I had to go, told me that I was "Off Route!"

This wasn't a problem with the GPS, it had me pegged right on I-5 the whole way. Every once in awhile the path merged back with the highway and I was able to get a mileage update. Another funny quirk was that the route overlay often obscured the highway name completely, not really helpful.

Physically, the GPS Companion for m500 is a little larger than the Palm V version, and its antenna is quite a bit bigger, making the small m515 not quite as pocketable. The combo is 9.2 ounces. Were you to put it in a backpack, you'd want to use the Palm's flip cover to protect the screen.

I had the Palm and GPS running for eight hours straight; the rechargeable lithium-polymer in the Palm was down to about half, and the GPS is still going on two AAA batteries a week later. They're supposed to last only 10 hours. On long trips, you're going to want a car charger for the Palm, or else you can run and charge both by buying the car charger for the GPS, which Magellan says will keep the Palm charged through the serial port. This cigarette lighter plug is the obvious solution for everyone, and it retails for US\$19.95. A car mount is also essential, and Magellan's Vehicle Mounting Bracket is US\$49.99. That adds about US\$70 to the price of the US\$199.99 GPS solution. Hopefully they'll offer it as a bundle for a reduced price as they did in the past. The Magellan GPS Companion is a worthy Palm m515 accessory, turning a good business companion into a good driving companion. ☺

—Shawn Barnett

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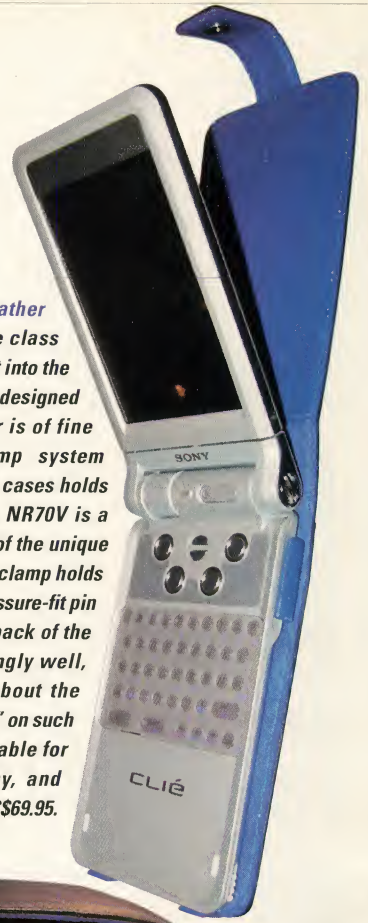


# Case Melange



Until PDA and computer manufacturers in general realize that we need our electronic gadgets to be as reliable in rain as our automobiles, we're going to have to rely on the creative souls at companies like Otter Box. The case at left is appropriately called Heavy Armor 2000. But it doesn't just protect the PDA inside from a good downpour, nor is it just crush-resistant, nor does it just float in water; it is also made of clear polycarbonate so you can beam through it, and the screen is a thick membrane that you can write through. There's also an external stylus and neoprene hand strap to help you hold it in wet conditions. Very cool protection for US\$49.95 [www.otterbox.com](http://www.otterbox.com)

Seidio's Xigma Napa Leather cases embody the same class and fine design that went into the Sony CLIE NR70V they're designed to enclose. The leather is of fine quality, and the clamp system employed by most of the cases holds the product firmly. The NR70V is a special design because of the unique properties of this PDA. A clamp holds the right side, while a pressure-fit pin pops into a hole on the back of the Sony. It works surprisingly well, though one wonders about the "meantime before failure" on such a method. It's also available for many other Palm, Sony, and Pocket PC handhelds. US\$69.95. [www.seidio.com](http://www.seidio.com)



Case Techworks has really honed their craft, as evidenced by these beautifully fitted cases. At left is a wonder so fine and versatile that it took three pictures to adequately illustrate it. It's called the Treo Convertible flip case. It's called convertible because you can use it two ways: with the front flip cover, as seen top left, or with only the antenna tether; one is more protective, the other allows more freedom of movement. It can also be ordered with or without the belt clip for US\$29.99 and US\$24.99 respectively. One must select model one two or three, depending on your Treo model. At right is a nice case for Treo 90 owners, with two recessed SD card slots. I especially like the fact that you don't have to remove the Treo flip cover to use it. The longer case above right is for the Sony CLIE T-Series, with a special flap that allows cradle HotSync while still in the case. Most of the new cases I've seen have a fine metal logo that is all Texas: rustic and classy.

[www.casetechworks.com](http://www.casetechworks.com)





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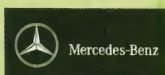


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# Olympia SoundBug

New technology is promising, but not quite ready

When it first appeared at CeBIT this year, the Web was abuzz with expectation of the little device you attach to any flat surface to transform that surface into a speaker. When the first product, called the Olympia SoundBug, arrived here, the office was abuzz, both from all the surfaces I quickly began transforming into speakers, and from the fellow employees who wanted me to knock it off. One of them found an excuse to leave the office entirely. I'm not exactly the life of the party, but

Using three AAA batteries as a power source, the small current from a headphone jack is amplified so powerfully by the Terfenol-D that when held against a flat surface with the SoundBug's integrated suction cup, it shakes the surface so forcefully and at such high frequency that the normally hard surface shakes the air around it like the tuned speaker cone.

And here's why everyone was annoyed with me. My desk is not a tuned speaker cone. Nor is the picture glass, nor the window



people don't usually just up and leave; we test stuff here all the time and everyone stays put.

First let me explain the technology as well as I can, then we'll talk about the reaction around here. The SoundBug uses what Wave Industries calls Magnetostriction. Using a military-developed magnetostrictive material called Terfenol-D (so named for the rare earth metals it's comprised of—Terbium [Ter], Iron [Fe], Dysprosium [D]—and the Naval Ordnance Lab [-nol] that developed it), a small magnetic force is applied and a significant, high frequency and forceful vibration is created. It was originally designed to overcome the comparative weakness of piezoelectric materials in sonar applications, which fatigue over time.

glass, nor the wooden floor, nor the metal cabinet. Each had a different stiffness, elasticity, and composition, and as such the Terfenol-D was only able to coax certain frequencies out of each surface. Granted, it is remarkable that it was able to do as well as it does, but those of us used to hearing music reproduced by conventional speakers will not find the SoundBug's reproduction to be satisfactory. Speaker manufacturers have studied for years, going to great lengths and expense, developing specialized materials to make their products reproduce across the wide range of human hearing, so it's perfectly understandable that the first US\$50 product attempt to turn your desk into a stereo system would be less than adequate.

Since the target market for this device is teens and travelers, it misses the mark halfway, because the speaker only performs reasonably as a transistor radio-quality speaker at its best. Teens tend to like their music loud and with bass; it's only the business travelers who are likely to be okay with low-volume, tinny playback. Percussion comes through a little too nicely as well, making it difficult to turn it down for personal use; those more than ten feet away will hear nothing but the percussion to their annoyance. Trust me, it'll make

most of them want to leave—or else harm you. It's interesting to know that this technology was originally designed to improve sonar, because often music sounds like you'd imagine it would from inside a fish tank, with odd echoes and warbles reminiscent of the submarine "pings" we're used to hearing in the movies, especially when the SoundBug is attached to glass and wood. This isn't noticeable at low volume, which is great

now that everyone has left the office and it's just me listening to old Al Green songs, but at volume high enough to compete with an office environment it doesn't sound good.

That doesn't mean that this product has no place. It actually works fairly well for verbal playback. I imagine with the careful application of computer audio analysis, a future model could listen to the sound emanating from the flat surface and modify its output accordingly. Perhaps multiple Terfenol-D elements could produce different sound ranges from a surface, just as speakers usually require several sizes to reproduce accurately across the audible spectrum. I don't know what methods they will be using, but I'm told there are indeed more products on the way. —Shawn Barnett

## A Palm of fewer Colors



Hey, what's a few thousand colors? News hit the stands in August that the Palm m130 didn't display the full 64K colors (65,536) that Palm's product literature and boxes claimed. When the dust all settled, it turns out that the screen is a 12-bit screen, which normally means that it can only display 4,096 colors. But through use of dithering, the screen is able to produce what Palm describes as "58,621 color combinations." Someone at Palm thought it was a few thousand more, hence the confusion, according to Palm. At first there was little more than the admission that there was indeed a problem. Later they said that they were thinking about what kind of remedy they would offer to m130 owners, then it came down to the actual offer early September. Owners of Palm m130 units could return them for a full refund, including tax, or they could take a concession prize of a US\$29.99 software application called SimCity. Given that we're talking a difference of 6,915 effective colors instead of 61,440 colors, it's no surprise that few users have responded to the refund offer. Meanwhile, here's hoping they're more careful with the next launch. —SAB



# RedMercury AcidImage

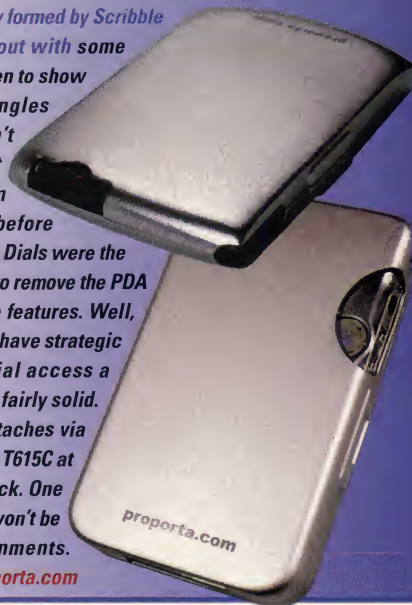
Makers of some cool gaming software, including AcidSolitaire, Red Mercury recently released version 2.0 of their AcidImage picture viewing software. AcidImage offers a few advantages I've not seen on other viewing software, including the ability to list and view pictures from on-board the PDA and on an external memory card. You can choose to open just one directory or all available directories. They've also included a unique feature, the ability to "drag check" a whole list of documents. Just slide a stylus over the checkboxes for the images you want to display, and they're all quickly selected. The software features a slideshow function, and a quick zoom that will go all the way in to single pixel density or all the way out, reducing the picture to a single pixel; they call it 1% to 1600% size. That's a little dramatic, but why not?

Version 2.0 is also compatible with the various screen resolutions on the market, including the Sony 320 x 320 and 320 x 480, plus HandEra's 240 x 320. Images autorotate on the 320 x 480 screen, and users can rotate images any time they like.

I would have to say that the coolest feature by far is that no image converter is needed to make the images compatible with the Palm. Just HotSync your JPEG files, either to a card or RAM and they will be opened. Definitely worth a free trial download, and you'll want to register it right away. US\$19.95. —Shawn Barnett



*Proporta, the new company formed by Scribble and PalmTec, has come out with some fine hard cases. I've chosen to show these two from odd angles because the front isn't where the action is. Most metallic cases for Palm devices were designed before memory card slots and Jog Dials were the norm, so you usually have to remove the PDA from its case to use these features. Well, these slick little numbers have strategic cutouts to make essential access a simple task. They're also fairly solid. The m500 model above attaches via the flip-cover slot, and the T615C at right snaps in from the back. One caveat: be sure your PDA won't be going in dusty environments. Approx US\$30. [www.proporta.com](http://www.proporta.com)*



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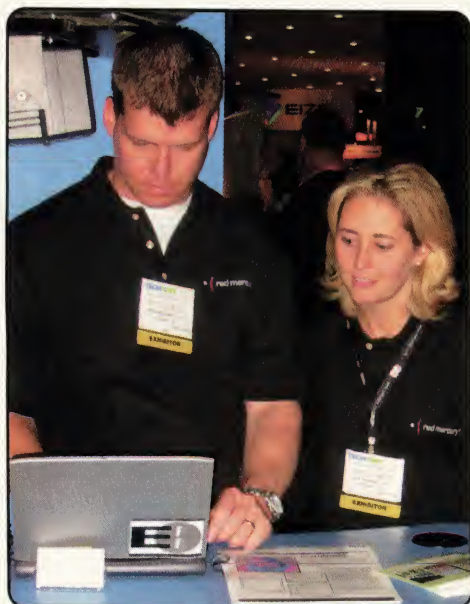
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The Red Mercury folks, Scott and Melissa Corley, working hard at PC Expo 2002.



# Gethightech.com

Broken PDA? There might be a do-it-yourself solution

So, you broke that old standby PDA and you don't think you can live without your old buddy? Fear not, there is a way to fix it yourself. The folks at Gethightech.com have quite an array of replacement parts for many different types of PDAs.

your taps and strokes-breaks. For the Palm III and VII series, the digitizer is only US\$45. Replacing the entire screen would be US\$65. Either is fairly easy to perform, and replacing the entire screen is actually easier, though not by much.

The digitizer glass came well packaged and wrapped in bubble wrap. I downloaded the most current videos from the website, unzipped them with WinZip, and got right to playing them. You need two

setting a thumbnail in the seam on one side or other. This usually breaks the first of three tabs free. Then you just keep pressing in on the back piece until all of the tabs on one side are unlocked. Then repeat the same on the other side.

The motherboard and screen are all one assembly that needs to be snapped away from the

from another connector, then the video shows how to insert an x-acto knife under the screen to pull

the digitizer away from the actual LCD screen. I recommend you be more delicate than you see on the video, because I accidentally scraped the top of the LCD glass and left a permanent scratch.

Finally, place the new digitizer glass over the LCD and plug in the connector. Reverse the disassembly process and snap it all firmly back together. My installation went off without a hitch. I put the batteries back in, powered it up, and ran through the digitization process.

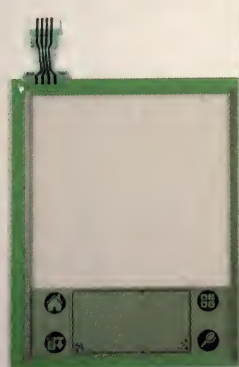
Most users would find this a reasonable and affordable solution

to make a broken Palm useful again. It's amazing just how snappy those old Palms were at doing the tasks most of us do every day, like looking up a phone number. Gethightech.com makes it easy to bring back your trusted electronic companions.

—Shawn Barnett



**With downloadable videos from Gethightech.com, you can acquaint yourself to the procedure before you commit to the repair yourself; if it's too much, you can just send it in to them. The shot above shows removing the digitizer from the LCD beneath.**



**Every PDA owner's nightmare: the broken screen. This one slid out of my shirt pocket while I was trying to free my hand from the swinging trash door at McDonald's. I was crushed.**

Their site now even features helpful videos to make those repairs easier.

I have an old Palm IIIx that has a broken screen, so I contacted Gethightech to see about

videos for this operation, one that shows how to take the unit apart and one to show how to replace the digitizer. For some reason they only played as audio on my Windows Media Player in Windows 2000, so I had to download Apple's QuickTime 6. They played without a hitch. Sorry Microsoft, not sure why that didn't work.

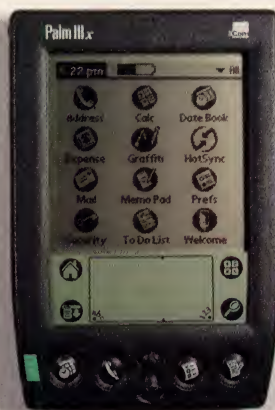
The videos make it look a little easier than it actually is to get the shells apart,

but I'm sure their main goal was to make the video easy to download for people with dialup modems. I typically start by squeezing from the top and in-



**This is the most common type of screen break, the digitizer. This is the glass that senses your taps and keystrokes. The LCD glass is just below it; were that broken, we'd likely see dark liquid oozing around the cracks.**

front bezel. When you do this, the rubber button array in the front falls out, and you're left with an uncased Palm device. You unhook the screen's ribbon cable from the motherboard, then remove the screen from the plastic frame that holds it all together. You then unplug the digitizer's ribbon cable



**Having followed the procedure properly, I now have a happy PDA with a slick new screen. Good as new.**

a replacement. Monochrome Palm screens consist of two layers, both of which can break. In most cases, only the digitizer—the front piece of glass that picks up



# Seiko InkLink Handwriting System

No velcro, no case required—ink goes from the paper to the PDA

The most intriguing booth at PDA Expo that year, a little over three years ago, had no frills at all. Just an extremely smart looking man, a PDA, and a pad of paper with a funny metallic contraption across the top. It was the most impressive booth I saw, and that product evolved into the US\$99 product you see at right. We've seen the basic concept in the Seiko SmartPad, but the two mechanisms are different. While I like the SmartPads, I don't really want to carry my pocketable PDA in such a big case.

The InkLink comes with a small translucent plastic case just a little bigger than a pencil box. It has three pieces. Frankly, I thought it would be cumbersome to set up, but it's remarkably easy. Just attach the Data Clip on the top left of whatever paper you like, attach the IrDA transceiver to the PDA, and plug it into the Data Clip. Then you just take out the InkLink Electronic Pen, turn on the Palm, select the InkLink pro-

gram, and start writing on your chosen piece of paper. Your writing instantly starts appearing on the PDA.

While the SmartPad senses the radio pen's position over what is effectively an "antenna pad," the InkLink senses ultrasonic waves that come from the pen each time you press down on the paper. The Data Clip triangulates on the high frequency signal and determines the position of the pen tip as it travels in the two-dimensional plane of the paper. It's called Binaural Technology, and it's surprisingly fast. No special knowledge is required, though it's some pretty advanced technology. Two transmission methods, ultrasound and infrared, make getting your notes into your PDA—and onto your PC—simpler than I thought possible. No handwriting recognition is supported or implied, just simple vector ink. It's great to see such a cool concept become a great product. *LB*

—Shawn Barnett



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# AlphaSmart 3000

Powerful in its simplicity, a harbinger of things to come

With directions printed on the back, and a full-size keyboard on the front, all I did to get started with the AlphaSmart 3000 was put in three AA batteries, read the first line on the back, press the On button, and start typing. Total time: 45 seconds. I love stuff like this. Much like the early Palm Pilot, this is a stripped-down, essentials-only device that appears to do its work perfectly. Pure word processor, no frills. Just function.

about to release their Dana product, a Palm OS-based device with similar specifications. As such, Dana will offer the ability to run all manner of existing Palm OS programs, extending the keyboard's ability to be a higher-function computer. Since it wasn't ready at press time, they sent me this to whet my appetite.

My unit came with both a USB cable and the AlphaSmart IrDA

the Pod into the USB port and made sure it worked with the software. That done, I just selected the document I wanted to upload from one of the eight "file" buttons across the top of the keyboard on the 3000, then I press Send. In a few seconds the two computers have linked up and the file is uploaded. Apparently it sends the text to the

eMate, the AlphaSmart is made for the education market. It is designed to be rugged, easy to port, and simple. The keyboard is surprisingly good. It's not quite like my notebooks—not quite as much tactile feedback as I'm used to, but still not bad. My typing is easily as fast on the 3000 as anywhere else, and the screen is pretty easy to read in decent light. The first version of the AlphaSmart, according to the company website, worked only with the Mac, introduced in 1993. The current 3000 is compatible with Mac or PC.

Those who've been doing this for awhile will remember the Tandy TRS-80 Model 100, arguably the first true "laptop" computer, and terribly popular with journalists and writers of all sorts. There are still

Tandy 100 fans around the world, and there are likely to be AlphaSmart fans out there as well. I have to admit, I haven't been this enthusiastic about a product since I got my first Palm Pilot. Straightforward design and good execution like this gives me goosebumps. I can't wait to see the Dana. US\$199 - 249; US\$229 as reviewed. —Shawn Barnett

clipboard, because then I have to go to into Word and select Edit | Paste. And all my text appears.

The AlphaSmart 3000 has a comfortably contoured aqua-green body, the color of which is close in appearance to the now-defunct Apple eMate. Like the

Wireless Pod for USB, which I've plugged into my Apple iBook (the iBook has no IrDA port of its own). After a quick software setup, I plugged

The reason it's in the Palm section is simple. AlphaSmart is just





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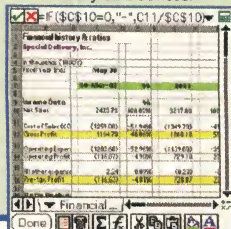
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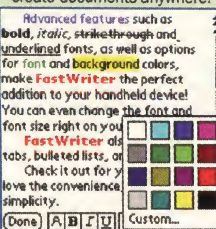


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# eLearningDynamics LearnTrac

Automating classroom tasks is just the first step

Remember the chorus of moans when your high school teacher would announce a quiz? Not in Jonathan Spears' class. Spears teaches tenth grade chemistry at Berkmar High School in Lilburn, Georgia, a typical New South town on the outskirts of Atlanta. So what's so unique about Spears' class that his students actually become excited at testing their knowledge? Wireless PDAs, that's what.

For the past year, Spears has been piloting a new system called LearnTrac, which combines wire-



Response Technology that automates the classroom environment. It consists of a 900MHz base station connected to the serial port of a teacher's laptop or desktop computer running LearnTrac's Windows-based software. Students

gives more time back to the instructor, as manual tasks like grading paper tests, taking attendance, handing out notes, and much more, are automated. At its most advanced, eLearning's developers have created an applications system that uses proprietary research algorithms to

evaluate students at the group and individual level. Aggregate, and student-specific, data supports teachers throughout the course, allowing users to better understand how they learn, and how they can do better.

"I'm trying to branch out this semester," said Spears. "Last semester I started by administering quizzes with LearnTrac. Now I'm taking more time to do analysis of the results, since LearnTrac mea-

sures against longitudinal and historical data." Sounds a bit like distance learning, doesn't it? However, it is actually intended to enhance rather than usurp standard teaching methods. In fact, it is designed to help improve how teach-



ers teach as much as it is to help students learn.

"LearnTrac is not technology for technology's sake," says former Berkmar teacher and eLearningDynamics' Director of Training and Develop-



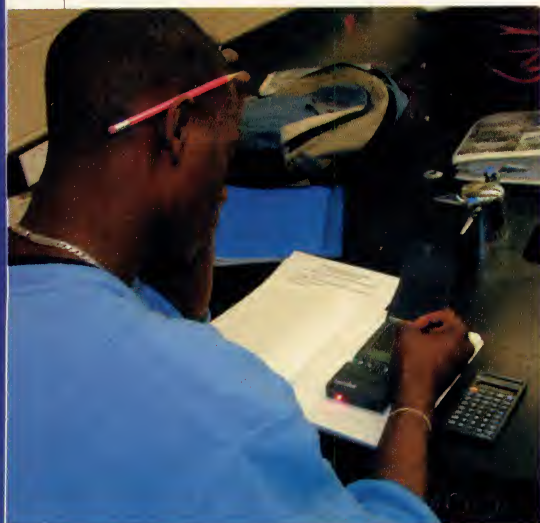
ment, Stuart Egan. "It gives a teacher a more intimate account of how students are doing." *—Steve Bush*

less technology with Palm Powered handhelds. LearnTrac, a product of eLearningDynamics (URL: <http://www.elearningdynamics.com>), is an Instant Student

are given Palm III handhelds equipped with a wireless adapter affixed to its base and loaded with LearnTrac software. From his laptop at the front of the classroom,

Spears can perform a myriad of tasks, including sending quizzes to all of his students and monitoring their progress in real-time. That immediate feedback allows him to review any material that they seem to have difficulty understanding, while it's fresh in their minds.

At its simplest level, LearnTrac





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by C. H. Blickenstorfer

## THE CONVERSATION

A conversation that never, ever took place

**Editor:** Ladies and gentlemen. Thank you so much for attending this meeting. As you may recall, in my last editorial I wondered why Microsoft didn't deliver the knockout punch to Palm when Palm was in the ropes. I wondered why you all, and especially Microsoft, didn't make more of an effort to establish the Pocket PC as the Number One PDA platform out there. I wondered why the grand Pocket PC 2002 launch was followed by pretty much nothing at all. The Xscale introduction came and went, Windows CE 4.0 was released in stealth mode, as was the Pocket PC Phone edition, and there really haven't been any new products to speak of. What is going on?

**Microsoft:** We are aware that we've perhaps played it a bit low-key. But you have to understand that squashing and annihilating a competitor is an absolute no-no for us in today's environment. We could wipe Palm off the face of the earth right now if we wanted, but then we'd have the whole justice department on our case by tomorrow. Between them self-destructing and the PDA market being a tiny part of our overall business, it was simply not worth it, so we decided to fly low.

**Editor:** Well, we suspected as much. Still, we think there's a difference between aggressively going after a competitor with the intent to dominate and defeat that competitor on the one hand, and enhancing and improving a product on the other hand. A few well coordinated introductions and releases would have been a boon to the Pocket PC platform without being considered a threat to Palm. How do you OEMs see it?

**Casio:** Don't ask us. Remember, we're the one who spent all that money coming up with the best Pocket PC lineup in the market just to see Microsoft wipe us out with their "StrongARM-only" policy for Pocket PC 2002. We had the first real multimedia Pocket PC in the Cassiopeia 1xx series, we had the first low cost multimedia Pocket PC in the EM500, we offered more

durable versions for business in the EG80/800, and we had industrial models in the IT70/700. All obsoleted by Microsoft because we used NEC processors. Sure, we tried to be good about it and not complain, and we had the StrongARM-based E-200 by a Taiwanese company, but can you blame us for being bitter? Why do you think we did the BE300 series?

**Compaq:** Don't look at us. We've done everything right, haven't we? Sure, the Casio E100 was nice, but it was us who put the Pocket PC on the map with the iPAQ. And last year we improved the original iPAQ with the second generation 3800 Series. Heck, when Pocket PC 2002 came out, everyone copied us: Reflective screen, button arrangement, jackets, everything. Then we were the first to add Bluetooth. And now we have an even better Xscale-based 3900 Series. Alright, no phone edition yet, but that's not far off. Why do you think Fiorina picked us and not their own stuff when our esteemed management decided to commit corporate suicide and merged us into HP?

**NEC:** Excellent question. You know that at NEC we've supported Windows CE from Day One, and that was a decision that cost us plenty. Sure we have some pretty great products in the various MobilePros, but it was a bear dealing with Microsoft's ever-changing Windows CE-strategies. So we first decided to pass on the Pocket PC but then so many people asked that we did one anyway. Had high hopes for it. The MobilePro 300 was a nice machine. But somehow we just couldn't get it to work right. Not for the consumer market, anyway. So we decided to lay low and make them available for those corporate customers who wanted them. Sorry.

**Toshiba:** Okay, so we're new to the game, and perhaps we've played it a bit too low-key as well. But we're here now and we've introduced more new Pocket PCs than anyone else, haven't we? Maybe we made a mistake not using the "Genio" name that worked so well for us in Japan, and maybe our first model was a bit generic, but you must admit that the ultra-thin, low cost e310 was very cool, and our new e710 has both an Xscale and internal 802.11b. Maybe we need to jazz up the design a bit and do some marketing, but we'd say we've done pretty well.

**Fujitsu:** Alright, alright. We know. Yes, we had the first Xscale Pocket PC in the Pocket Loox, and we knew it was a darn cool machine and we could have made a big splash. But that's just not us. We're not into making big splashes, and there really wasn't agreement inside the company on what to do with the product. The Siemens folks really liked it for the European market, but in the US we first thought we should introduce it, then decided against it, then for it, then against it again. Now, we just sort of sell it to our customers if they ask for it.

**HP:** It's a non-issue for us, now that we got the iPAQ. Those babies sell themselves. So we had to ditch the Jornada brand. That's life. It's too bad we had to dismantle the Jornada team because they had finally come up with a real contender in the 560 Series. But the iPAQ had the name, so we let the old Compaq team do its thing. As for Microsoft and their strategy, that's their business. We fully support them.

**Editor:** What about the Pocket PC Phone Edition?

**HP:** We had a product for Europe, the Jornada 928. It was essentially a 560 Series with a phone on top. Makes little sense to pursue that now that we have the iPAQ. Besides, PDAs are small fry. Why bother with a subset of them? We'll leave that to the Scandinavians.

**The rest:** Yes, that's risky business. Pocket PCs don't add much to our bottom line, so why spend money on a convergence product that may get us bad press. We'll leave that to the Scandinavians.

**Editor:** Will Xscale have an impact? And what about CE.net aka Windows CE 4.x?

**Everyone:** Yes, Xscale is nice and we'll all migrate. So far there isn't much incentive as we've told the first machines aren't much faster, if at all. As for CE.net, we'll just wait for Microsoft. We'll go along with the flow. All we can do, really.

**Microsoft:** We can't comment on that. And we wish our worthy competitors at Palm the best.

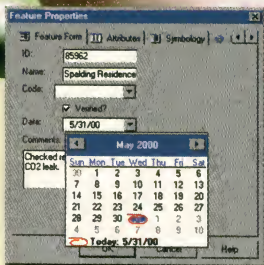
**Editor:** Thank you all for your candor. I am sure you all know that we here at *Pen Computing Magazine* hope to see some real action in the Pocket PC market again real soon, and we're sure we speak for our readers and your customers as well. ☺

Have you ever wondered why the Pocket PC is suddenly so low key? Here's a conversation that never took place, yet may shed some light on this vexing issue...





# ArcPad Mobile Mapping and GIS

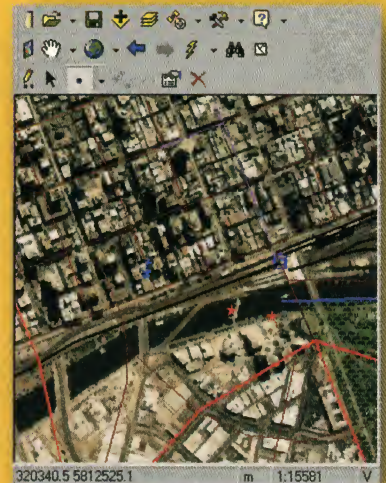
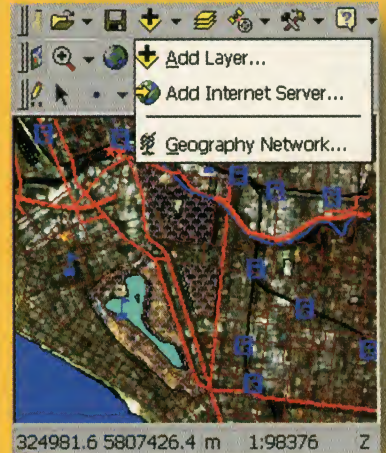


User-defined forms for data editing

ArcPad™ software is a mobile GIS technology. It makes data collection in the field easy and efficient. You can create a copy of your geographic information system (GIS) data from your desktop and it is ready to use on your handheld mobile device. Data can also be provided from the Internet including wireless support. Global positioning system (GPS) receivers can optionally be added facilitating direct data capture. Data is now immediately available and validated in the context of an actual map.

## ArcPad supports

- Shapefiles
  - MrSID™ image format by LizardTech
  - Wireless data acquisition and query
  - Multilayer, scale-dependent display
  - User-defined forms for data editing
  - GPS interface
  - Data capture
  - Hyperlink to external files
  - Query, find, and measure tools
  - Integration with desktop GIS
- 
- ArcPad runs on Windows® CE, Pocket PC, 95/98, NT, and 2000.
  - Try ArcPad today! An evaluation copy is available for download at [www.esri.com/arcpad](http://www.esri.com/arcpad).



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# MAPOPOLIS

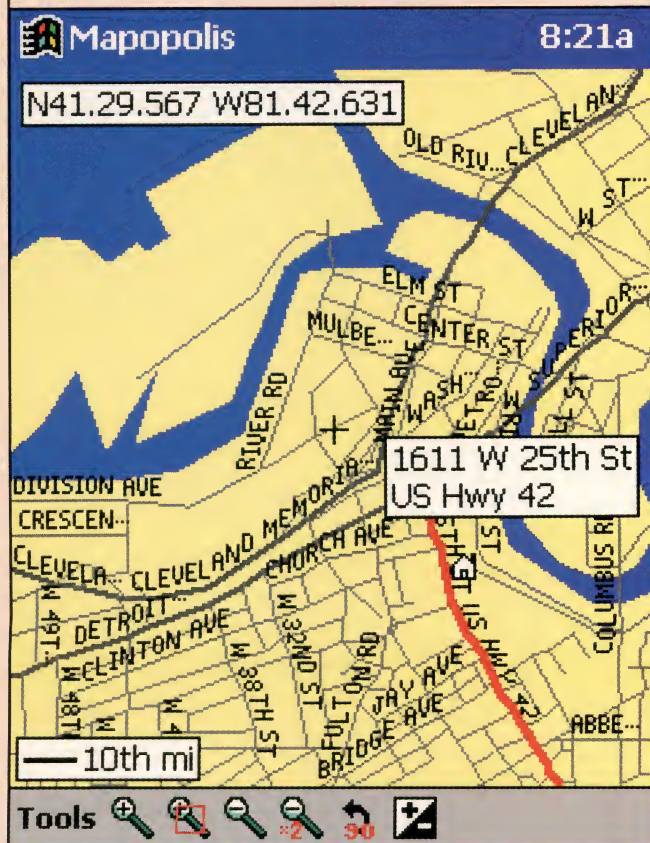
## HANDHELD MAPPING FOR POCKET PC

**W**e have reviewed perhaps a dozen different handheld mapping products here at *Pen Computing*, but Mapopolis is the best I've seen. I like it not only for its hair-trigger performance and straightforward, uncluttered user interface, but for the way it is sold. You download the viewer for Pocket PC, Palm OS, or RIM device, then pay a reasonable annual subscription fee for whatever level of map detail you need. A one-year subscription to a map library covering the United States, for example, costs under US\$50. If you need greater detail, you pay a bit more. It's simple and flexible, allowing you to pay for whatever you need.

I tested the Pocket PC version on a T-Mobile Pocket PC Phone Edition and was amazed at the scrolling and zooming speed. Best of all, as you scroll, the street names scroll along their routes, overcoming the most annoying aspect of using handheld computer-generated maps: getting lost and scrolling around to find a landmark to get your bearings. After all, these tools are supposed help us find our way, not confuse us further.

Mapopolis allows you to select an address from your contact list, tell it where you are (or determine it from any NMEA-compatible GPS), then let the program generate both a highlighted route on the map and turn-by-turn directions. Neat.

—David MacNeill Mapopolis • [www.mapopolis.com](http://www.mapopolis.com) • US\$50 and up



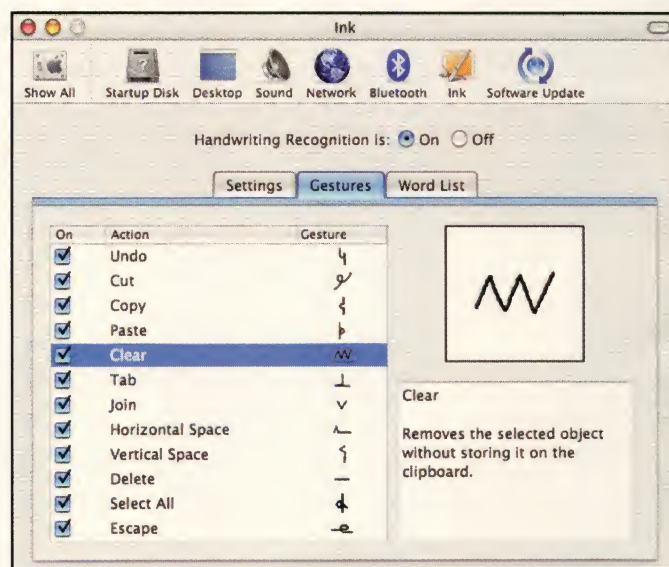
Continued from page 20

universally lauded as the the most accurate, user-friendly printed handwriting recognition system you could buy for any computer platform. Within a few minutes of use, one could achieve accuracy far better than other reco systems, the best of which took days of training to be usable at all. Rosetta on the 162MHz StrongARM-powered MessagePad 2100 remains the most satisfying recognition experience you can get outside a research lab, and these machines are now five years old — a lifetime in the computer business.



### Recognize this?

Even with Steve Jobs' disparaging remarks about Newton, he clearly understands that the recognizer the Newton Systems Group had developed was potentially valuable. Though he is no fan of pen-based computing, enough people must have convinced him of the superiority of Rosetta. Should Apple ever undertake to build a tablet Mac or a handheld, Rosetta could be vitally important to success.



Thus we have Steve on stage earlier this year, proudly demonstrating the redubbed technology as part of the newest release of Mac OS X. Inkwell can be used only with a Wacom graphics tablet, such as the 6x9-inch Intuos 2 that I used for this review. Plug it in and the OS automatically activates the Ink control pane. Once recognition is turned on, you have two ways to use it. You can write anywhere, or restrict it to operate only in InkPad: a floating window in which the full command set is available to you including a variety of handy control gestures. In Inkpad, once you have the text you want, you tap Send and the text is "typed" into any ordinary application with an insertion point. You can even switch to a graphic mode that will send just the anti-aliased ink or drawings into apps that can accept graphics along with text, such as Microsoft Word.

How does it work? Splendidly, though it would be far more effective and natural on a touchscreen. There is a disconnect between what your hand is doing and what is happening on your screen that takes a little getting used to. Sorely lacking is Rosetta's punctuation menu that is activated by tapping on the caret mark. Because the characters are so small, punctuation is one of the bugaboos of reco systems in general. The caret pop-up is the best solution I've seen, so I hope it makes its way into Inkwell in the next rev. Apple did include another Rosetta editing function: click the function button on the Wacom stylus barrel and a word list pops up with variations on the word under your caret. Even Rosetta's secret Easter eggs are buried into Inkwell. Write "Rosetta!" three times and observe the Newton-era result. Not all good things come to an end.

—David MacNeill ([dave@pencomputing.com](mailto:dave@pencomputing.com))





# PHATWARE

[www.phatware.com](http://www.phatware.com)

Founded in October 1997, PhatWare® Corporation is a leading provider of state-of-the-art software products for the mobile and desktop computing marketplace. PhatWare's product line includes many popular titles such as HPC Notes™, HPC Spell™, HPC NetProfile™, HPC Translate™ and others. As of May 2001 PhatWare Corporation exclusively manages development, support, and distribution of ParaGraph's CalliGrapher® and PenOffice™ hand-writing recognition products.

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The elegantly styled Toshiba e310 offers full Pocket PC power and features in an ultraslim package and at a very low price.

## IN BRIEF

The elegantly designed T-Mobile Pocket PC combines a full Pocket PC with a high-end cellphone. Using Microsoft's Pocket PC 2002 Phone Edition platform, the T-Mobile works just like any other advanced Pocket PC, but you can also use it as a cell phone with call forwarding, speaker phone, note taking, conferencing, and even SMS messaging. A GPRS radio allows sending and receiving of email as well as web browsing. The phone functionality is nicely integrated rather than grafted on, making the T-Mobile a pleasure to use. Battery life is much better than we expected and the display, though limited to 4,096 colors, is exceptional. GPRS data transfer is slow, but quicker than CDPD. Note that the T-Mobile uses the GSM standard, so make sure service is available in your area.

## DURABILITY

The T-Mobile feels very solid and well built, but it is not meant to be a rugged device. It does not have a protective screen lid, so use a case to keep the display from getting scratched!

## COMPETITION

Smartphones, the Audiovox Thera Wireless Pocket PC, and a variety of Palm OS-based PDAPHONES from Handspring, Samsung, and Kyocera.

## CONTACT

[www.t-mobile.com](http://www.t-mobile.com)

# T-Mobile Pocket PC Phone

FIRST HARDWARE TO USE POCKET PC PHONE EDITION

BY C. H. BLICKENSTORFER

**G**ood news: Hardware for the long-awaited Phone Edition of Microsoft's Pocket PC is finally available in the United States. On August 1, 2002, T-Mobile USA announced the availability of the T-Mobile Pocket PC, a device that integrates a full cell phone and full wireless data connectivity into a full-function Pocket PC that uses GSM for voice and GPRS for data.

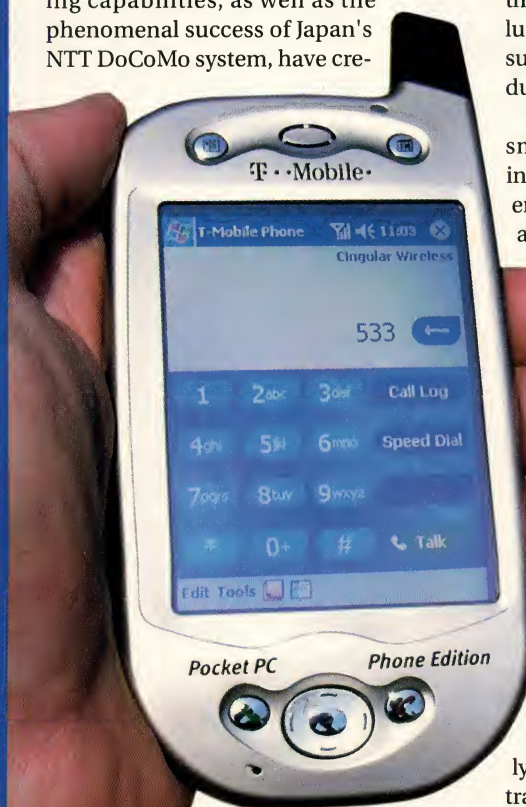
Merging voice and data in a single device, of course, has been tried before. In 1994, the IBM/BellSouth "Simon" received much praise, including a "Best of Show" award at Comdex, but was a commercial flop. Subsequent attempts were the GEOS-based Nokia 9000, the EPOC-powered Philips Data Companion, and the Ericsson MC-12 that consisted of a cellphone and a HP handheld, but all failed to capture the imagination of the buying public. More recently, the rapidly growing number of cell phones with limited email and web browsing capabilities, as well as the phenomenal success of Japan's NTT DoCoMo system, have cre-

ated renewed interest in a device that can do it all. The Treo 180 was received well enough to make Handspring change course and concentrate on communicators instead of just PDAs. Does this mean that the era of personal communicators, of devices that can do it all, has finally arrived? Microsoft thinks so, and so does T-Mobile, the US subsidiary of German telecommunications giant Deutsche Telekom.

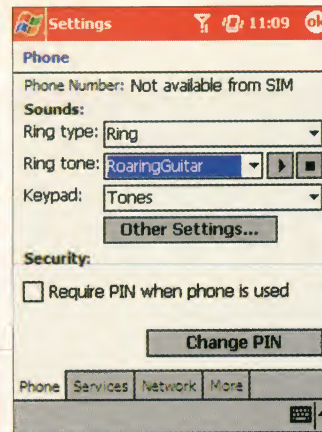
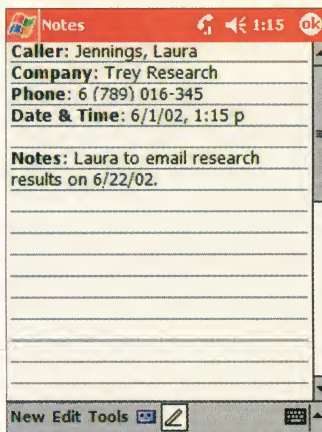
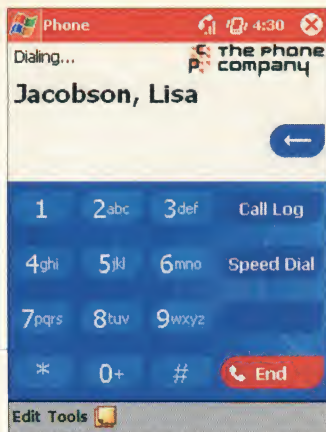
### What is the T-Mobile Pocket PC?

The T-Mobile hardware itself is absolutely gorgeous. Made by HTC of Taiwan, the company that actually makes the majority of all Pocket PCs in use today (including the iPAQ), the T-Mobile is as visually stunning in 2002 as the original iPAQ was at its debut in early 2000. Its sleekly rounded all-metal case is a thing of beauty. The antenna nub, while adding a bit to the length of the T-Mobile, is ingeniously integrated into the overall design and also serves as the stylus holder. Every corner, every angle, every surface looks and feels just right. This is industrial design at its best.

By Pocket PC standards, the T-Mobile is small and handy, measuring just 2.8 x 5 inches and being only 0.7 inches thick. The entire device—including battery, radio and all—weighs just 6.8 ounces. Only a couple of years ago, this would have been impossibly small and light for a PDA of its day, let alone one that also includes a full cellphone and a wireless data radio. By current cellphone standards, of course, the T-Mobile is relatively large and heavy, but then again, it also has a real 240 x 320 Pocket PC LCD display rather than a tiny cellphone screen. Speaking of the display, it is a 3.5-inch diagonal reflective TFT. Reflective displays have front-mounted sidelights and the T-Mobile's is located alongside the bottom of the LCD. It lights up the display brightly and evenly. And the display itself is razor-sharp, contrasty, and very easy on the eyes.







Pocket PC Phone Edition screen shots (from left to right): using the dialer; taking notes during a call; connection notification box; settings control panel

From a technology point of view, the T-Mobile Pocket PC hardware combines new with tried-and-true. Overall, it is a very skillful integration of cellphone and wireless connectivity into a small and very elegant device that sets new standards in several respects. Combining all those functions into one sleek device is nothing short of amazing. On the other hand, in a brandnew device I would have expected an Intel XScale processor instead of the good old 206MHz StrongARM, and I would have liked to see 64MB of RAM instead of just 32. RAM costs money, but 64MB has become the standard for Pocket PCs, while 32MB can quickly fill up when you add lots of data and more than a couple of third party programs to the device. However, while I do wish for the extra RAM, I have no problem with the StrongARM. It provides all the performance I need and the few XScale devices we've seen haven't really been much quicker. I never felt the T-Mobile was not fast enough.

On the expansion front, the T-Mobile has a SD/MMC card slot which is great for backing up data (essential in any Pocket PC!) and carrying around music and other multimedia files. SD cards now come in sizes up to 256MB—enough to carry plenty of data, pictures, and even music files. One drawback is that, for now, there are no 802.11b cards using the SD interface. Lots of people have 802.11b wireless LANs these days, even in their homes, and I'd prefer to do email or browse the web through a fast 802.11b connection than a slow and costly GPRS link when I am within a coverage area. Since T-Mobile is the company that offers pay-as-you-go 802.11b wireless broadband service in hundreds of locations nationwide, including airports, and Starbucks coffeehouses, the T-Mobile would have been a natural to also be able to pick up those signals through a CF Card slot. Fortunately, 802.11b SD cards are expected early next year when SyChip-based cards will hit the market.

In the power department, the T-Mobile is equipped with an internal Li-Ion battery pack. Battery life is quite good. Even with hard use and frequent calls and use of the

GPRS wireless internet connection, the battery of my review device easily lasted throughout a full day, and mostly longer. I should mention that the internal battery is not user-changeable and that there is a clip on the back of the device that, according to the manual, is for an external battery.

The T-Mobile comes with a smartly designed leather carry case that allows access to all functions. It has a belt clip from which it is quickly disconnected when you need it, and yet the clip is secure enough so that you are not constantly afraid to lose it. The case cover is held in place via two small magnets. Unfortunately, the small pieces of metal that connect to the magnets scratch the front of the T-Mobile. I am sure this will be fixed in the shipping version.

#### Hardware observations

With a device as innovative and beautifully designed as the T-Mobile it seems ungrateful to criticize anything, but that's our job. So here are a few observations:

First, like the 3800 and 3900 Series iPAQs, the T-Mobile does not have an separate on-board AC adapter jack. Instead, the AC adapter plugs either into the charging cradle

or into an adapter dongle. The iPAQ's dongle is permanently attached to the power cable and cannot be lost whereas the T-Mobile's comes loose and will easily be lost. Then you'll only be able to charge it via the cradle. Not good.

In terms of button placement, the T-Mobile departs from the tried-and-true Pocket PC standard of two each function buttons flanking a navigation disk at the bottom of the screen, and perhaps a rocker on the side offering a second way of navigation. Instead, the T-Mobile has two function buttons on top of the screen and two at the bottom, flanking a small navigation disc. The ones at the bottom take and terminate a call whereas the ones on top bring up the phonebook and calendar. Since the ones on top can be reached with your thumb when you hold the device, I'd have liked those to pick up and terminate a call.

A button on the side, where the audio recorder has been since the dawn of the Palm-size PC, now activates volume control instead. And for once, I would have appreciated a rocker to scroll up and down, but there is none.

In the display department, I have always



## SPECIFICATIONS

|                  |  |
|------------------|--|
| PROCESSOR        | 206 MHZ INTEL STRONGARM SA1110                         |
| OS               | MICROSOFT WINDOWS POCKET PC 2002 PHONE EDITION         |
| COMMS            | IR/USB   |
| WIRELESS         | GSM/GPRS INTEGRATED VOICE/DATA PHONE                   |
| MEMORY           | 32MB RAM, 32MB FLASH ROM                               |
| EXPANSION SLEEVE | NA   |
| SLOTS            | 1 SD CARD (BOTTOM)                                     |
| DISPLAY          | 3.5" 4,096 COLOR REFLECTIVE TFT                        |
| CONTROLS/LID     | PASSIVE STYLUS, 4 FUNCTION KEYS, NAVIGATION DISC/NO    |
| DIMENSIONS       | 5.0 X 2.8 X 0.7"                                       |
| I/O              | IRDA, USB, DC, EARPHONE (STEREO)                       |
| WEIGHT           | 6.8 OUNCES   |
| POWER            | INTERNAL LITHIUM-POLYMER PACK (12 HRS/180 HRS STANDBY) |
| EXTRA SOFTWARE   | SMS MANAGER, MSN MESSENGER                             |
| OPTIONS          | SD CARDS, CASES, SD BLUETOOTH, USB SYNCH CABLE         |
| PRICE            | US\$549.99 PLUS SERVICE PLAN                           |



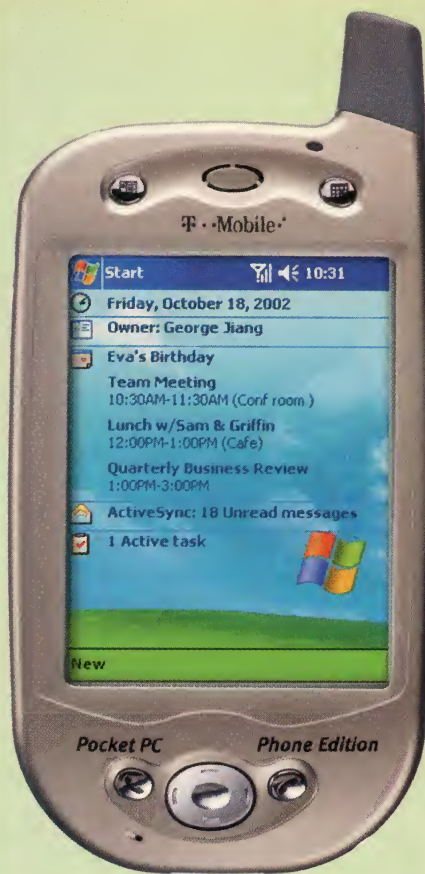
been more partial to the larger 3.8-inch screens than to the smaller 3.5-inch variety which the T-Mobile uses. Also, inexplicably, the backlight control panel only lets you turn the sidelight on or off; you can't set it at different levels. And the display is 12-bit color only (4,096) as opposed to the by now industry-standard 16-bit. No real big deal, but it definitely makes a difference when you view images.

A final and potentially harmful glitch is the presence of a hard reset hole at the right bottom of the device. Pressing it, instead of the slightly larger hole on the other side of the docking connector, will turn off the battery and thus wipe out all data that hasn't been saved to a card. A hazardous solution. I should mention that the hard reset hole is very small so that you actually need a pin, or unscrew the top of the stylus that has a point for just this purpose, to activate it. Fortunately, the T-Mobile has a good SD Backup utility that saves all data to a SD Card. There are no options; the utility saves all data, which is okay, and I don't miss the choice of only saving data or applications and data.

A gripe that has nothing to do with the T-Mobile: the Pocket PC Connection Manager continues to be a near incomprehensible application that I avoid like the plague because it simply makes no sense at all. Microsoft really, really needs to fix that.

### The SIM

No, this is not an inhabitant of Maxis' hugely popular game. The SIM (Subscriber Identity Module) is the heart and soul of any GSM phone. It's a small card, smaller than a MMC/SD card, that contains all information about your service, your phone number and registration, and it also contains memory space for a limited amount of contact data. The SIM goes into the side of the T-Mobile. Without it, the T-Mobile cannot be used as a phone. All SIM cards come with a PIN (Personal Identification Number) to guard against anyone else using your account in case of theft. The T-Mobile can be configured to request the PIN every time you use it, or you can turn it off. You can change the PIN to something easy for you to remember. The SIM is transferable between phones. If you go somewhere where you don't want to risk damaging the shiny, expensive T-Mobile, you can just pop the SIM into an old clunker phone and off you go (as long as the clunker is a GSM phone, that is). The Phone Edition comes with a SIM Manager screen. The SIM Manager is essentially a separate phone book where you enter, edit and store SMS contacts, send them messages, or copy them to the Pocket PC's standard Contacts application.



### Phone and wireless capabilities

Now how about the phone and wireless features of the T-Mobile? This is, after all, what sets the T-Mobile apart from just a PDA.

For anything data-related—email, web browsing, instant messaging and such—the device automatically “dials” the provider and establishes a GPRS connection. Once you're done the connection terminates. For the most part, you get GPRS service wherever you have cellphone service. I say for the most part because while GPRS uses the same system, it requires the installation of some additional technology by the carrier. By and large, GPRS worked fine, though at times it seemed that even when the signal was strong enough for a voice call, it wasn't strong enough for a data connection.

For voice calls the T-Mobile works just like a standard high-end cell phone. To bring up the phone, simply push the phone button or select “Phone” from the menu. The phone application shows the last call, an onscreen keypad, and access to call logs and speed dial with up to 99 entries. The call log provides summary information about the number of calls and call time. Individual call log entries provide one-button call-back or SMS messaging as well as access to any notes that may be attached to a call. Or you can create a new Contacts entry automatically. You can also take notes during a call. The note will have the caller's name, the phone number, and the time of the call already on it. Needless to say, to take a note you'll have to use the T-Mobile ei-

ther with the headphone assembly or in speakerphone mode. The speakerphone works exceptionally well. The T-Mobile's speaker is fairly powerful and the microphone is usually good enough to make for acceptable voice quality on the other end. For the most part, you can easily have the T-Mobile sit in front of you on a table and carry on a conversation that works well both for the caller and the receiver.

The screen shots on pages 73 and 75 show a) the expanded pop-up used in the Inbox where you can now just tap a contact to place a call, send a SMS, or bring up the SIM manager, b) the main phone screen whenever the T-Mobile is used as a phone, and c) the Notes application that lets you record notes while on a call.

### Integration, not just addition

Microsoft tried very hard to provide extra functionality by not just adding cell phone to the Pocket PC but by integrating wireless capabilities deeply into the device. To that extent, those who are familiar with Pocket PC 2002 will find subtle changes throughout the device, all geared towards making the most of the Phone Edition's built-in wireless features. In the Contacts application, for example, you only need to tap a phone number to place a call immediately. The Today screen shows some new icons. One indicates signal strength and whether the phone is on or off. Others shows connection or synchronization status, the presence of instant messages, SMS messages or emails, and battery status. The screen provides also access to the call log, voice mail, and the T-Mobile phone book. The ring is really a .wav file and can be changed to anything you want. And the phone can either ring or vibrate or both, and there are also different kinds of ringing, like increasing tone, or just once. One feature that I found annoying is that sometimes tapping/holding on an item will bring up another menu with options to pick from whereas at other times, the T-Mobile will immediately start a call, whether that was your intention or not.

During a call, you can either place a second call to start a conference call, or you can accept a second incoming call to do the same. And when a call comes in while you are, for example, listening to music, the music volume will automatically go lower so the ring can be heard, and the music pauses altogether when you pick up the call. All that, and you really don't give up anything even compared to a high-end phone. Voice mail, caller ID, call forwarding, call waiting, it's all there. Conference calls can be tricky on some phones, but that's an area where the T-Mobile shines. Voice quality during conference calls remains excellent, though





Pocket PC Phone Edition screen shots (from left to right): SMS is now an Inbox service; reading a SMS message; turning the phone off; sending a SMS

at times the system seemed to switch to Half Duplex (i.e. all noise from the other parties disappeared and I only heard myself talking until someone else spoke up). Most likely, that's a function of some of the carriers the T-Mobile is using when you're roaming.

One potentially grave glitch occurs when you're checking mail while downloading it. I get tons of spam, so I just download the headers. GPRS isn't exactly fast, so the emails come down at a relatively leisurely pace, allowing me to select a few at a time and delete them on the spot. Unfortunately, that whole selection moves up a line when the next email arrives, to that you may delete messages you did not want to delete. Microsoft needs to fix this.

## SMS

The Inbox has been modified to send and receive SMS (Short Messaging Service) messages via the inclusion of SMS as a new service. Sending and receiving SMS messages is just like using email, only you don't need an internet connection. And SMS messages go out like lightning. In the screen shots above you can see how Microsoft added SMS, how you compose a SMS message (you can also select from a repertoire of canned phrases via the "My Text" menu), and how incoming SMS messages pop up on your Today screen.

While SMS has primarily been a European and Asian phenomenon, many US mobile operators are now offering this neat little interactive messaging service as well. In Europe, SMS is so popular that a poll conducted by a British interactive TV station called "The Dating Channel" suggests that 40% of the respondents would rather give up chocolate than SMS, and 10% would do without television before they pass on SMS. Interesting. In the US, SMS is much less ubiquitous and the general lack of inter-carrier SMS which precludes just typing in the target's phone number initially slowed SMS adoption. In the past, SMS messages could only be sent to and from users on the same carrier, but inter-

carrier messaging is now increasingly common. All you need to know is the phone number of the receiving party. Personally, when I first received the T-Mobile I thought I'd have little use for SMS, but I can see now how it can come in very handy for quick messaging. In fact, I have started using it to dash off, and receive, ultra-quick messages to colleagues and friends. The only caveat is that you first need to figure out if their phone can actually receive SMS messages.

## MSN Messenger

The MSN Messenger instant messaging application has been part of Pocket PC 2002 before the arrival of the Phone Edition. However, it's much more fun with the T-Mobile because you never have to worry about connectivity. If you have a hotmail, msn, or passport account (and who hasn't?), you just log in and you can instant-message to your heart's content. I love using MSN Messenger with the Transcriber handwriting recognizer. I've been using Transcriber and its predecessors for so long that reco works near perfect for me, and it's cool to simply write on the screen, see it converted to text, and sending it off as an instant message.

## Corporate email and server ActiveSync

All Pocket PCs support both the POP3 and IMAP4 email protocols. However, Microsoft also offers the Microsoft Mobile Information Server (MIS) which extends Exchange email across wireless networks and also provides wireless synchronization via a server. Depending on your circumstances, this may or may not be important. I just want to mention it because the availability of secure corporate email can be a deal-maker or -breaker. So if your corporate IT department uses Exchange and the Mobile Information Server, the T-Mobile is ready to take full advantage of that.

## What is T-Mobile USA?

For those unfamiliar with the name "T-Mobile," it is part of the T-Mobile International group, which is the wireless telecomms

subsidiary of Deutsche Telekom. In the US, T-Mobile aims to provide service to 96% of the population by the end of 2002. T-Mobile provide wireless voice and data through GSM (Global System for Mobile) and GPRS (General Packet Radio Services), GPRS being an extension of the GSM architecture for wireless internet access at speeds up to 56kbps. With tri-band phones (900/1800/1900 MHz), T-Mobile customers can use one phone and one number in 80 countries worldwide. There is a flat international roaming rate that begins at 99 cents a minute, without any additional monthly service charges. This means you can use your T-Mobile Pocket PC outside of the United States, but first you need to call T-Mobile and activate international roaming. There are five voice rate plans starting from US\$19.99 to US\$149.99. Data is billed separate at three levels from US\$19.99 for 5MB to \$59.99 for 20MB. One concern I have here is that the Pocket PC's browser, which is essentially a full PC browser, will burn through five and even 20 megabyte very quickly. With T-Mobile you also get a "My T-Mobile" web portal that provides news, sports, account info, online email, address book, calendar, stock quotes, horoscopes, phone alerts, games and so on.

## Bottomline

No one knows just yet if the world is ready for a convergence between cell phones and PDAs. And no one knows if such a convergence makes sense in the first place. Be that as it may, in my book the T-Mobile/Pocket PC Phone Edition combo is the best attempt at a completely integrated wireless voice and data communicator I have seen yet. Microsoft and its hardware partners really went all out on this one. Even my Palm editor had to admit: "The phone is better than the Treo's." And at a projected price of \$549 when you sign up for service, it's affordable as well. No product or service is for everyone and that applies for the T-Mobile as well. But if you've been waiting for a powerful wireless PDA that is also a cell-phone, this is it. The wait is over.





## IN BRIEF

Offering a number of firsts in the Pocket PC arena, Toshiba takes the lead in the technology race. New performance potential is on tap with Intel's XScale PXA250 microprocessor, though few applications today support the chip's power management properties. ATI Imageon 2D graphics offer improved graphic performance, but only with software designed to support the chip. The big news is the built-in WiFi Ethernet LAN technology, offering up to 11MBPS broadband net access when in range of a public or private WiFi base station. With its dual slots (CompactFlash and SecureDigital), removable battery, optional high-capacity battery pack, and clip-on expansion port for attaching to presentation projectors, the e740 is the Swiss Army Knife of Pocket PCs.

## DURABILITY

The Toshiba e740 is a consumer electronics device and isn't meant to be used in rugged environments. It is well built, but has exposed openings. There is no screen lid. Instead, the unit comes with a slip case with built-in screen protector.

## COMPETITION

Only Compaq's pricey, top-shelf iPAQ Pocket PCs can stand up to this well-equipped powerhouse of a machine. No others need apply.

## CONTACT

[www.toshiba.com](http://www.toshiba.com)

# Toshiba Pocket PC e740

FIRST POCKET PC WITH INTEL'S 400MHZ XSCALE CHIP, ATI GRAPHICS, AND INTEGRATED WIRELESS

BY DAVID MACNEILL

In terms of technology, little has happened in the Pocket PC arena lately. Comparing the current crop of products has gotten decreasingly interesting as the machines become more alike. Compaq continues to lead the pack while those remaining to compete are matching the iPAQ in every way they can. HP has dropped out of the fray with their recent subsuming of Compaq, which is a shame since my daily-driver Jornada 567 is the most reliable Pocket PC I've used to date. Casio is out of the picture — for now, anyway, and NEC's MobilePro is flying low.

Then there is Toshiba, the new kid on the block. With commanding resources including billion-dollar R&D investments and world-class manufacturing capability, Toshiba wants to play — and they are not content to take a following role in the technology department. The new e740 offers three firsts in the Pocket PC space:

- Intel's 400MHz XScale PXA250 chip, the latest iteration of the StrongARM technology that's been the muscle in the world's most powerful PDAs since Apple's Newton ruled the earth.
- Built-in 11 Mbps WiFi (802.11b) wireless Ethernet networking for broadband Internet access from any private or public "hot spot."
- ATI Imageon 100 2D video processor for faster, smoother graphic performance when using applications designed to take advantage of the chip.

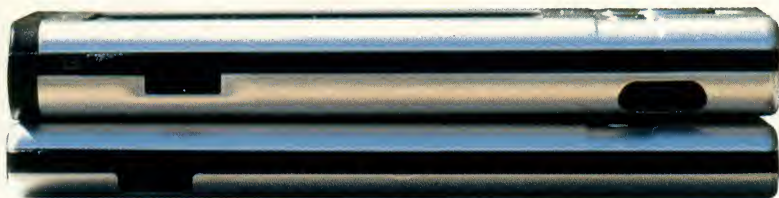
You'd expect the performance of the new XScale chip to be the big news here, but it turns out that the performance improvement is marginal. Applications must be written to take advantage of the unique properties of the new microprocessor, including its ability to downshift to slower, less battery-intensive speed levels when the task at hand does not require all 400MHz chewing up your milliamp-hours.

### The big news

No, the big news is built-in WiFi. Reliable WiFi CompactFlash cards from Socket and Symbol have been around for some time, but the ad-







The Toshiba e740 is just a few millimeters thicker and an ounce heavier than Toshiba's entry model, the svelte e310. Even so, they've managed to pack a CF slot, an SD slot, a removable battery, ATI graphics, and integrated WiFi (802.11b) wireless Ethernet networking — all for under US\$600. (Note the e740's poorly positioned battery release slider, top right.)

vantage of integration makes a real difference. On the e740, the drivers and control panels are in the device's ROM, so you'll never lose your ability to connect if your unit gets its memory erased — an unpleasant event that is all too common an occurrence for Pocket PC users. (Though I may be harder on my machines than most end users, my Pocket PCs experience total amnesia around once a month, usually when I'm traveling. Fastidious adherence to a backup regimen is the only thing that saves me from these machines. With a full backup on an SD or CF card, what would have been a serious disaster becomes a mere annoyance. With Pocket PCs, it's not a matter of *if* your data will spontaneously vaporize, but *when* it will.)

I compared the wireless signal range on the e740, with its integrated antenna, to my Jornada 567 with its Socket Low Power WLAN WiFi card. They were within a few feet of extinguishing simultaneously, and at a distance comparable to my main squeeze, an Apple PowerBook G4, and my Windows machine, a Fujitsu Lifebook P1035 — both with integrated WiFi.

While the performance was world-class, the battery life plunged to around two hours when the WiFi radio was enabled. Toshiba included a handy on/off switch for the radio on the bottom of the e740, a switch you'll want to use whenever you are out of range to save your power pack from premature exhaustion. Happily, Toshiba offers an optional high-capacity battery pack for heavy wireless users on the go.

### Powerlessness

Speaking of power loss, the Toshiba e740 has a major design flaw that can cost you all your work. The removable 1000mAh lithium-ion battery pack is released by a vertical slider on the side of the device that can easily be disengaged by sliding out of a tight pocket. When the battery pops out, even a little, all your data is instantly gone. You could cover the switch with silver tape, but it's a shame to have to do such a kludgy thing on a US\$600 handheld computer.

While we're hanging out in the complaint department, let me also mention that I found the position of the voice recording button to be exasperating. Every time I took the unit out of its slipcase, I pushed the button accidentally. I finally solved the issue by assigning a more useful action for this switch: it takes me to the Today screen,

something I'm far more likely to want to see when I first pull the machine out.

### Self storage

With the mere addition of a few millimeters of thickness and about an ounce in weight compared to the entry level e310, Toshiba has managed to cram just about every feature you could want in a pocket computer into the e740. You get both a CompactFlash slot and the increasingly desirable SecureDigital slot. With both these storage options available you have no excuse not to backup regularly to your preferred media. Since the e740 has 64MB of internal storage, I'd suggest investing in a 128MB SD card so you can back up your entire machine and still have room left over for 64MB of photos, ebooks, and music files. Save the CF slot for a Bluetooth card, a GPS receiver, or a GPRS modem. Thus equipped, there is little you cannot do with this rig.

For business users, Toshiba offers an optional US\$100 expansion pack for displaying presentations on standard projectors. It clips to the bottom of the unit for easy handling while you stand and deliver using the device as your handheld teleprompter. The e740 includes IA Presenter, software for editing and displaying PowerPoint slides.

Even with its minor flaws, the Toshiba e740 is a real contender in the race for Pocket PC marketshare at the high end of the spectrum, a space dominated by Compaq's increasingly pricey iPAQs. It of-

fers more value for your dollar than the iPAQ and is slightly smaller overall when you take into account the iPAQ's CF sled. If you favor a clean, utilitarian design aesthetic, are a regular user of WiFi networks, and don't mind having a centimeter of tape over the battery release, the e740 is worth a very serious look. —David MacNeill



## SPECIFICATIONS

|                  |  |
|------------------|--|
| PROCESSOR        | 400 MHZ INTEL PXA250 (FORMERLY KNOWN AS "STRONGARM")     |
| OS               | MICROSOFT WINDOWS POCKET PC 2002                         |
| COMMS            | IR/USB   |
| WIRELESS         | INTEGRATED WIFI (802.11B)                                |
| MEMORY           | 64MB RAM, 32MB FLASH ROM                                 |
| EXPANSION SLEEVE | HIGH-CAPACITY BATTERY, EXPANSION PACK FOR PRESENTATIONS  |
| SLOTS            | 1 SD CARD AND 1 CFII CARD                                |
| DISPLAY          | 3.5" 64K COLOR REFLECTIVE TFT                            |
| CONTROLS/LID     | PASSIVE STYLUS, 4 FUNCTION KEYS, NAVIGATION DISC, ROCKER |
| DIMENSIONS       | 4.9 X 3.1 X 0.6"   |
| I/O              | IR, USB, DC, EARPHONE (STEREO)                           |
| WEIGHT           | 6.1 OUNCES   |
| POWER            | REMOVABLE 1000MAH LITHIUM-ION PACK                       |
| EXTRA SOFTWARE   | HOME MENU, IA PRESENTER FOR ATI, ADOBE ADOBE READER      |
| OPTIONS          | SD CARDS, LEATHER HOLSTER, SD BLUETOOTH, BATTERY PACKS   |
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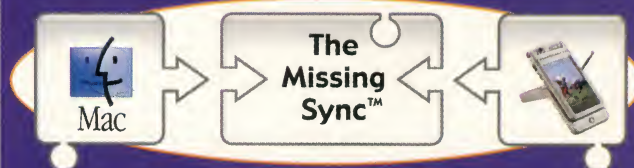
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## The Difference Engine



DAVID MACNEILL

I believe the PDA, as we have come to know and love it, is toast. Traditional, data-only handheld devices that are unconnected from wireless networks are old hat. What matters now is the communicator, or PDA/mobile phone combo device.

The driving force behind the shift is simple: people love their mobile phones and won't be without them. You can use them while driving or walking, eyes ahead instead of downcast, squinting at an LCD. Mobiles are ubiquitous and rate plans are cheap. Virtually everyone either has a mobile or wants one.

PDAs are popular since they make it easy to remember things, read and write email, jot down notes to yourself, look at your photos, and so on. While geeks may enjoy carrying multiple gizmos, most people don't want the hassle of juggling proprietary batteries, chargers, headsets, and of course, navigating dissimilar user interfaces.

They no longer have to. The miniaturization of PDA and mobile phone electronics has reached the point where either function can be added to the other for less than US\$50 at the manufacturing level. The two devices share many common parts: a low-power CPU, LCD displays and video circuitry, lithium-ion or lithium-polymer batteries, internal flash memory, keypads, speakers, microphones, headphone jacks, and even memory card slots. Building them into a single unit just makes sense, but getting the balance just right is the ultimate challenge for designers.

You probably already have some fairly powerful PIM functions in your mobile. Most people don't use them since they are difficult to access when you need them and even harder to get all your data into using the numeric keypad. Some phone makers are getting wise to the latter problem. My Ericsson T68i came with software to sync with Outlook, but I'm planning to use Apple's forthcoming iSync and iCal applications across a Bluetooth wireless connection to my PowerBook.

## Change in the air

The communicator idea isn't new. In the mid-1990's, BellSouth Wireless (now known as Cingular) marketed the IBM-built Simon communicator. It was an expensive beast and sold extremely poorly, but it was a credible attempt. Other companies tried various designs with little success. The wireless networks of the day simply weren't sophisticated enough, and the components available to designers were simply too big and power hungry to make a compact device that didn't resemble a walkie-talkie. Steve Capps, chief architect of the Newton MessagePad, told me that they absolutely intended to build Palm Pilot-sized Newtons with wireless connectivity, but that the pieces and parts they needed simply weren't available.

Adding voice to such a device would have been the next logical step, particularly since Apple has always been cozy with Motorola, the hottest cellular phone maker of the day. I'll never forget seeing Gaston Bastiens, head of the Newton division, walking around the first (and only) Newton Expo with a MessagePad and a black StarTAC held together in one hand.

Up north, Microsoft was playing around with variations of the communicator theme throughout the 1990's but abandoned them all. It wasn't until they released the Pocket PC Phone Edition this year that the vision took shape. Coming soon will be the slimmer, more phone-like design called Smartphone 2002. I personally feel this slimmer design has a better chance of success so long as they leave in the recognizer.

In the Palm-powered world, no licensee is more committed to building communicators than Handspring. Their Treo 270 (GSM) and Treo 300 (CDMA) have received rave reviews for their excellent integration, compact size, and overall cool factor. Kyocera and Samsung both make well-regarded communicators based on the Palm OS, but it's the Treo that seems to be the winning combination of design and functionality. But the Treo is far from perfect.

### In-your-face interface

No one has yet created the ideal human interface for communicators. Microsoft is trying it both ways: PDA-like and phone-like, but both designs have weaknesses. What is needed is a totally fresh approach, and the word on the street says it will be Apple, teamed up with Apple co-founder Steve Wozniak, who will get it right. The widely rumored iPhone would have many of the user interface brilliance of Apple's hot-selling iPod music player, combined with the best features of Wozniak's Danger Hiptop communicator. The Hiptop uses the always-on GSM/GPRS network for voice and data, packaged in a bar soap-sized device with a swing-

out display and a very friendly interface. The specifics of what a reunited Jobs and Woz will come up with is anyone's guess, but one thing is certain: everyone will want one, just like everyone wants an iPod.

As I see it, the biggest problems facing designers are text entry and device shape and weight. In a time when we expect our phones to be small, many people will refuse to carry machines the size of an iPAQ or a Sony NR70. As a device gets smaller, so does the display, and a tiny display means difficult text entry and difficult viewing of media and webpages. Thumbpads are a workable solution for many, and they are quite popular on the Treos and RIM Blackberry variants. But many of us prefer Palm's Graffiti and Microsoft's Transcriber recognition software, and you need a slightly larger display for these to make sense.

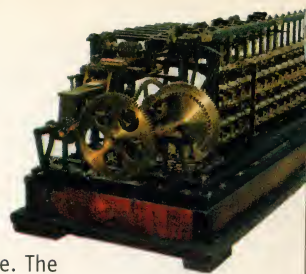
I envision an alternative in Bluetooth-based input devices and remote displays. Folding QWERTY keyboards are already popular among PDA users, and Ericsson offers the clip-on Chatboard for their popular T68 GSM phones. Why could I not have a wireless writing pad that would send my digital ink via Bluetooth to my mobile? Why couldn't such a device also serve as an enlarged version of my phone's display? As when using today's Bluetooth headsets, the phone would stay in your pocket while you do everything you need to from your folding "chatpad".

### Revenue service

The other reason communicators will ultimately trump the PDA is that they offer more profit. Communicators will cost more than a typical mobile phone and, unlike a PDA, will provide an ongoing revenue stream. Our hypothetical iPhone, for example, could cost you US\$500 paid to Apple, US\$80 per month in voice and data charges paid to Cingular, and an additional US\$10-\$20 a month for location-based and Apple's .Mac services such as email, PIM syncing, and access to your online photo albums.

PDAs won't simply disappear overnight, of course, nor will they depart the industrial markets where they and their tablet brethren are replacing the clipboard paradigm. Entrenched, well-understood technologies tend to stay around for a long time after new ones come on the scene. As long as they get the job done, why replace them? Over time, new applications will emerge that require communicators, so all those battered old Palms and Pocket PCs will be phased out.

But for the technology enthusiast, carrying a conventional PDA will seem quaint in a year or two. I can feel change in the air.





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